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ABSTRACT

By setting current legal definitions of parity in the context of history, this report traces how the parity price and parity income concepts developed. It identifies some of the consequences of price and income parity on agricultural resource use and efficiency, on the size and structure of the agricultural sector, and on the extent of producer discretion permitted by government intervention necessary to achieve such parity. How parity is being used in today's farm programs is highlighted. Earlier critiques of parity concepts are reviewed, and the case for changing the formulas is evaluated. Finally, alternative standards of equity to the parity price are offered. Cost of production, marginal social cost, and parity income are examined. Eighty-seven references and 12 data tables are included. (YLB)

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Agricultural Economic Report No. 571

Agricultural Parity: Historical Review and Alternative Calculations

Lloyd D. Teigen

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ABSTRACT

Changes in the structure of agriculture and income distribution among producers make parity prices obsolete indicators of farmer well-being. This report chronicles the history of parity, surveys critiques of parity, and discusses changes that might reduce price distortions resulting from the use of the parity concept. Possible changes include adjusting the parity price formula by redefining base period prices and treating interest and taxes differently. New standards of equity, including cost of production, marginal social cost, and parity income, are examined.

Keywords: Price policy, income support policy, structural change, parity prices, parity income, farm welfare.

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SUMMARY

Changes in the structure of agriculture and income distribution among producers have made parity prices obsolete indicators of farmer well-being. This report presents a historical review of parity, an equity concept whose purpose is to balance the welfare of farmers in relation to the welfare of others. It does so by revisiting the origins, development, use, and past adjustments that have been made in parity formulas. Also provided are a set of possible alternatives for changing the way parity is conceived and implemented so that it more accurately reflects today's agriculture.

Parity was defined as an agricultural program concept in the Agricultural Adjustment Act of 1933, and includes both a parity price concept and a parity income measure. A parity price is intended to convey to a unit of commodity, such as a bushel of wheat, the same purchasing power that it had in the 1910-14 base period. Parity income is a comparison of the income of farm families with that of nonfarm families, and is achieved when farm families attain the same living standard as nonfarm families.

Parity prices are part of a farm price policy which seeks price enhancement rather than market equilibrium. Parity prices are no longer viable because they are unrelated to commodity prices. For example, market prices of farm commodities in 1985 and 1986 were close to 50 percent of parity, or about half the purchasing power those units had during 1910-14. But today's more highly efficient agriculture produces commodities at least cost, thereby mitigating the decline in purchasing power. The average income of farm households from both farm and nonfarm sources, consequently, has exceeded the median income of all families in the United States since 1964 and equaled 118 percent of the median family income of all families in 1983.

Alternatives proposed in this report would change parity price by basing it on a new equity standard of marginal social cost and would broaden the distribution of income parity by making lump sum payments targeted to certain producer classes. Other recommendations call for retaining parity prices but redefining base-period prices; changing how interest and taxes are treated in the parity formula; computing separate parity indexes for commodity groups; modifying the present formula to eliminate the effects of Federal commodity support programs and export subsidies on parity prices; adjusting the parity index to reflect farm productivity gains achieved since the 1910-14 base period for parity was established; and updating the base period.

Because incomes vary by size and type of farm, no unique set of commodity prices will achieve parity income for all farms at the same time. For example, statistics reported here indicate that farms with sales greater than $100,000 have historically exceeded parity income, but farms with $40,000 to $99,999 worth of sales have not achieved parity income since 1980. The smallest farms would not attain parity income even if their product prices doubled. In view of the farm sector's diversity, policymakers would have to identify and target a particular group of farmers to achieve an income parity standard. Analysis presented here shows that payments of $8,000 to $10,000 per farm would ensure that the total income of the average farm operator household in farms of every size would at least equal the median income of all U.S. families.

Using the concept of price elasticity of farm family income, this report shows how distortions of income distribution wrought by price enhancement policies occur. By revisiting parity, the author examines a possibly useful role for price policy in U.S. agriculture. One role, for example, could be nonprice-enhancing while protecting farmers from unexpected price declines, and while permitting market equilibrium in most years. Such a price policy would balance farmers' welfare with that of others, preserving the original spirit of parity.

Agricultural Parity: Historical Review and Alternative Calculations

Lloyd D. Teigen*

INTRODUCTION

> There is widespread agreement among agricultural economists that parity prices are not good bases for agricultural price and income controls. The reasons for this are comparatively simple and clear. Parity prices freeze price relationships among agricultural products, and among agricultural and other products, in a pattern that in most cases is more than 30 years out of date. ...Parity is unsatisfactory in its other use--as a standard for measuring the economic status of agriculture. It is highly inaccurate. ...The inaccuracy of parity price as a measure of net farm income results from the fact that net farm income varies not only with prices but with quantities produced. It also varies with the costs of production (that is, with the quantities as well as the prices of the goods and services used in production) (*57*).[1]

Geoffrey Shepherd, citing six of his contemporaries, used those words to open his 1946 article on "A Rational System of Agricultural Price and Income Controls" (*46, 48, 54, 62, 87*). Shepherd's criticisms are still valid 40 years later. Yet, parity prices remain a permanent part of agricultural policy.

The equality, or equivalence, implied by the term "parity", conveys a sense of justice to the legal constructs of parity price and parity income. Parity prices are used as bases for determining agricultural price support levels and administering other farm programs. The base period for the legal construct is 1910-14, the 5 years immediately preceding World War I. Conditions of that period allowed farm numbers, land in farms, cropland harvested, and farm population all to increase without adverse effect on prices. The base period for parity was a time when the people who lived on farms were perceived as receiving a fair

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[1] Italicized numbers in parentheses refer to items cited in the References at the end of this report.

share of the income and growth of the economy. Consequently, the price/cost relationships of that time were perceived as fair for the businesses that produce farm commodities.

Parity was written into price support legislation in the 1930's, first as a broad goal and later as a more specific tool used in setting levels of support prices through loan rates, purchase prices, or other devices. Although achieving the parity price was a goal of most agricultural legislation, never was it required that supports be set at 100 percent of parity. In contrast with the fixed relative prices of commodities, given by their parity prices, support prices have some flexibility because permanent legislation permits support at different percentages of parity for different products. This report takes issue with support prices based, implicitly, on 100 percent of parity prices. Although political forces periodically call for a return to "full parity" rather than to some fraction less than 100 percent, this report's intent is not to determine what fraction of parity would constitute a "just" price for farm commodities. Rather, it aims to identify a number of improvements to the parity price formulas and to offer a number of alternative performance standards for the farm sector.

A parity measure can serve a number of objectives. It can be used to set price support levels by formula, avoiding some of the political effects of negotiating the level of support in administrative or legislative arenas. For instance, price support levels for wool, tobacco, and peanuts are currently determined by formulas which use the parity index, among other factors.

Architects of parity may have intended to assure a minimum level of income for farm operators, but not all farms have the same volume of sales and the income effects are related to sales. As an indicator of the farm sector's economic performance, the parity ratio (of the "prices received" by farmers to the "prices paid" by farmers) measures the terms of trade (or barter price) between the farm sector and the rest of the American economy. However, it ignores the key factors of quantities, costs per unit, and number and size of farms.

Most farm policies fall into five broad categories: farm income, farm prices, agricultural resource use and production efficiency, agricultural organization and farm population, and individual producer freedom and government intervention (*25, 28, 33, 34 38*). This report identifies some of the consequences of price and income parity on agricultural resource use and efficiency, on the size and structure of the agricultural sector, and on the extent of producer discretion permitted by government intervention necessary to achieve such parity.

By setting current legal definitions of parity in the context of history, we trace how the parity price and parity income concepts developed and suggest alternative definitions. We highlight how parity is being used in today's farm programs. Earlier critiques of parity concepts are reviewed and the case for changing the formulas evaluated. Finally, we offer alternative standards of equity to the parity price standard.

THE HISTORY OF PARITY

> [This] recital of the origins and evolution of the idea of parity for agriculture is intended to show that the concept as we know it did

> not spring full-blown from the brain of some economic Jupiter, but rather grew out of the continuous groping for a concrete measure of justice for the farmer, and was steadily modified by the conditions prevailing in the economic life of farmers and the nation. In other words, parity did not develop as the practical application of an economic theory immaculately conceived, free from all taint of original sin in the form of class interest. On the contrary, ... whatever economic justification can be found for it in its present form may be considered largely a rationalization.
>
> In view of these aspects of the problem, a considerable unreality is evident in any attempt to expound a theory of parity. Parity is a practical economic and political expedient, not a theory (*22*).

Origins

The idea which came to be called parity developed in the early 1920's to describe the agricultural depression that followed World War I.[2] The U.S. farm sector was growing as the frontier was being settled in the early years of the 20th century. High farm prices during World War I encouraged even more production. The advent of peace and onset of mechanization slowed the growth of demand. The farm problem of the 1920's was correctly perceived as low per capita income of farmers resulting from low prices which, in turn, resulted from overproduction.

The idea of parity had both statistical and political origins (*6*). If there had never been any statisticians collecting data on prices of farm and other commodities, there never would have been "farm parity." On the other hand, the parity movement was merely the outward expression of the maladjusted relationship between agriculture and the rest of society that developed at the end of World War I.

The parity concept was introduced at a conference on agricultural policy called by Secretary of Agriculture Henry C. Wallace in 1922. At that conference, George N. Peek named it "fair exchange value" (*16*). Legislatively, the concept emerged in the first McNary-Haugen (tariff) bill.[3] The bill spelled out very carefully the method of measuring the inequality of purchasing power of farm products and the means by which this inequality was to be dispelled. In the pamphlet "Equality for Agriculture" which Peek privately printed in 1922, "a fair exchange value for any crop" was defined as "one which bears the same ratio to the current general price index as a ten-year pre-war, average crop price bore to average price index, for the same period" (*50*).

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[2] Much of the historical discussion is adapted from John D. Black's chapter, "The Evolution of Parity," in his 1942 book Parity, Parity, Parity (*6*).

[3] The first McNary-Haugen bill was introduced in 1924 but was defeated in the House. The second and third bills were passed by Congress in 1927 and 1928 but were vetoed by President Coolidge. The protectionism inherent in these bills was a major cause of the Great Depression.

Peek got the statistical bearings for his idea from a USDA bulletin, Prices of Farm Products in the United States written by George F. Warren (*85*). Warren, a Cornell University professor, had been touring the country interpreting the separate price movements of 20 farm products and changes in the "all commodities" index of the Bureau of Labor Statistics (BLS). Warren explained that the "all commodities" price movements resulted from monetary factors and the individual commodity price changes were due to supply and demand conditions for that product.

The U.S. Department of Agriculture (USDA) invited Professor Warren to Washington, DC, to author a bulletin based on his ideas. That publication, issued in 1921, designated the ratio of prices received by farmers to the all-commodities wholesale price index as "the purchasing power of farm products." The farm price series was a weighted average, weights being the relative production of different crops and livestock products as reported in the 1910 Census of Agriculture.

In 1922, the USDA began publishing a purchasing power index series on a regular basis in Weather, Crops and Markets (*69*). Prices in 1913 were called the base, or 100. By 1921, the index value was 61, compared with a value of 111 in 1918. After several revisions of the weights in both the "all-commodities" and the "prices received" indexes, the parity ratio appeared at or above 100 for the entire period 1924-29. The farm products whose prices had risen most had increased most in output, notably dairy products and tobacco. But this revision was not released until September 1934.

Index Revisions

In the meantime, statisticians recognized that farmers spent little of their income in wholesale markets, and spend most of it in retail markets, where since World War I, prices on a relative scale had been higher (*5, 9*). Accordingly, a special index had been under construction for the prices of commodities actually bought by farmers in mostly retail markets. It was released in 1928 as the index of "prices paid by farmers." The parity ratio in these terms was 74 in 1921, and by 1929 equaled only 89.

USDA released a new index of "prices received by farmers" in 1934. At the same time, USDA updated the index of prices paid by introducing as weights the 1924-29 quantities bought by farmers. This action put the base period weights on the same footing for both indexes. These two series, index of prices paid and index of prices received, attained great significance because the 1933 Agricultural Adjustment Act was administered in terms of them, and subsequent legislation has used them to express the parity concept. The 1921 parity ratio under this definition was 82, that for 1925 was 99, and that for 1929 was 95. The Great Depression, however, pushed the ratio down to 61 in 1932.

The prices paid and prices received series came together during 1925-29 because farmers were buying more goods whose prices had declined significantly (such as automobiles and tractors) and were selling more commodities whose prices had risen (such as dairy and tobacco). The same dynamic explains why the prices paid index based on 1910 purchase weights implied higher prices than the index using the 1924-29 quantities.

Politically, the index revisions meant that the lower the parity ratio, the stronger a case could be made for higher farm prices by farm interest groups and the McNary-Haugen trade protectionist lobbies.

Legal Definitions of Parity

Definitions change with time. To show how parity concepts evolved, we contrast current definitions of parity prices and parity income with those set forth in earlier legislation.

Parity Prices: Early Legislative Meanings and 1948 Update

Parity prices are computed in a three-stage process in which the index of prices paid by farmers (the so-called "parity index") is calculated, the adjusted base period prices for each individual commodity are calculated, and the two are then multiplied to yield the "parity price" for individual commodities (64).[4] USDA now calculates parity prices for 142 commodities (78). Parity prices for 78 commodities are calculated monthly, and the remainder are calculated semiannually (including 41 commodities for which the National Agricultural Statistics Service (NASS), formerly the Statistical Reporting Service, no longer estimates monthly or season average prices). In the past, USDA calculated parity prices for as many as 160 agricultural commodities.

Early Statutory Definitions. The Agricultural Adjustment Act of 1933 contained the first definition of parity. The act stated that it was the policy of Congress to--

> ... reestablish prices to farmers at a level that will give agricultural commodities a purchasing power with respect to articles that farmers buy, equivalent to the purchasing power of commodities in the base period. The base period in the case of all agricultural commodities except tobacco shall be the prewar period, August 1909 to July 1914. In the case of tobacco, the base period shall be the post-war period, August 1919 to July 1929.
>
> ... approach such equality of purchasing power by gradual correction of the present inequalities therein at as rapid a rate as is deemed feasible in view of the current consumptive demand in domestic and foreign markets.

Several amendments to this first definition stipulated an alternative base period for the purposes of marketing agreements or marketing orders where determining the purchasing power of a commodity would be difficult. The alternative base period would be used in cases where a commodity's purchasing power could not be--

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[4] Parity prices are computed under the provisions of Title III, Subtitle A, Section 301 (A) of the Agricultural Adjustment Act of 1938, as amended by the Agricultural Acts of 1948, 1949, 1954, and 1956.

> ... satisfactorily determined from available statistics of the Department of Agriculture. The base period, for purposes of such marketing agreement or order, shall be the postwar period, August 1919 to July 1929, or all that portion thereof for which the Secretary finds and proclaims that the purchasing power of such commodity can be satisfactorily determined from the available statistics of the Department of Agriculture.

Provision was also made for calculating parity prices in such a way as would--

> ... give to the commodity a purchasing power with respect to the articles that farmers buy equivalent to the purchasing power of such a commodity in the base period; and, in the case of all commodities for which the base period is the period August 1909 to July 1914, which will also reflect current interest payments per acre on farm indebtedness secured by real estate, tax payments per acre on farm real estate, and freight rates, as contrasted with such interest payments, tax payments, and freight rates during the base period.

During 1910-14, the "golden age of agriculture" on which parity is based, the farm sector was viewed as receiving a "fair share" of the economy's income and growth.

That purchasing power is measured by the "parity index," which is a composite of prices paid by farmers (1910-14 base period) for commodities and services, interest, taxes, and wage rates. Items used in farm production and items used for family living are included among both the commodities and services. The production items in the prices paid index include inputs such as feed, seed, fertilizer, and feeder livestock that are used only by specialized enterprises and inputs such as fuel, motor vehicles, and machinery that are commonly used on all types of farms. The family consumption items in the prices paid index have been represented by the consumer price index (CPI-U) since 1978. By pricing items where farmers buy and sell them rather than at central markets, USDA removed an explicit index of freight rates from the parity index to prevent double-counting.

1948 Redefinition. In response to economists' widespread criticisms of the parity price concept and to the political climate of postwar America, Congress changed the legal definitions of the parity index, parity prices and parity income during enactment of the Agricultural Adjustment Act of 1948 (*2, 3, 6, 33, 35, 46, 57, 62, 87*). Those definitions remain in force today.

Under the 1948 law, the "parity index" is the ratio of:

> (i) the general level of prices for articles and services that farmers buy, wages paid hired labor, interest on farm indebtedness secured by farm real estate, and taxes on farm real estate, for the calendar month ending last before such date to (ii) the general level of such prices, wages, rates, and taxes during the period January 1910 to December 1914, inclusive.

The 1948 act changed the base price concept from average 1910-14 prices for individual commodities to "adjusted base prices," which are the most recent 10-year average prices received for the commodity deflated by the corresponding 10-year average of the index of prices received for all commodities. The 1948 law defined the "new" parity prices as the product of the adjusted base period prices and the parity index. The act also provided for a "transitional" parity price to smooth adjustment from the old to the new definition. The change had the effect of retaining the purchasing power parity of all agricultural products at the 1910-14 levels, but allowed relative parity of individual commodities to be based on recent performance and to fluctuate in response to changing market conditions (*60*).

The adjusted base period (1910-14) price for each commodity is derived from the average price received in the 10 most recent complete calendar years and the corresponding 120-month average of the index of prices received by farmers (1910-14 base). An allowance is made for unredeemed loans and other supplemental payments farmers receive for commodities grown under price-support programs. The adjusted base price, multiplied by the parity index, gives the parity price for the specific commodity. This process permits parity prices to be calculated for commodities like soybeans, which were not widely grown in 1910-14. The moving average underlying this changing base period price effectively raises the parity price for commodities whose recent price performance is stronger than the aggregate and lowers the parity price for commodities with weaker than average prices.

Parity Income

The first statutory definition of "parity income" appeared in the Soil Conservation and Domestic Allotment Act of 1936, which declared that the purpose of the act was the--

> ... reestablishment, at as rapid a rate as the Secretary of Agriculture determines to be practicable and in the public interest, of the ratio between the purchasing power of the net income per person on farms and that of the income per person not on farms that prevailed during the 5-year period August 1909-July 1914, inclusive, as determined from statistics available in the Department of Agriculture, and the maintenance of such ratio.

The 1936 definition was revised in the Agricultural Adjustment Act of 1938, which provided that--

> "Parity," as applied to income, shall be that per capita net income of individuals on farms for (sic) farming operations that bears to the per capita net income of individuals not on farms, the same relation as prevailed during the period from August 1909 to July 1914.

Both definitions relate to income ratios that existed in the same time span as the base period established for determining parity prices: 1910-14. Income parity under the 1936 definition was realized in every year between 1941 and 1956, and, under the 1938 definition, was realized each year between 1942 and 1955, with 98 percent of parity achieved in 1941 and 1956 (66). The absolute levels of farm and nonfarm incomes per capita have been regularly published in the Income and Balance Sheet Statistics (74).[5]

The Agricultural Act of 1948 redefined parity income, effective January 1, 1950, in the following way--

> "Parity," as applied to income, shall be that gross income from agriculture which will provide the farm operator and his family with a standard of living equivalent to those afforded persons dependent upon other gainful occupation. "Parity," as applied to income from any agricultural commodity for any year, shall be that gross income which bears the same relationship to parity income from agriculture for such year as the average gross income from such commodity for the preceding 10 calendar years bears to the average gross income from agriculture for such 10 calendar years.

The 1948 act thus ushered in the standard of living concept of income parity, a subtle improvement over a money-income concept. A person's living standard depends on the goods, services, and intangibles consumed (including environment,

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[5] This income data appeared in tables 52-55 in the 1983 issue, but were not published in the 1984 issue.

health, safety, aesthetics, and lifestyle) rather than on income gained from work. To the extent that monetary values can be attached to a standard of living, they derive from the expenditure on items of consumption rather than from occupational income. However, differing preferences among farm and nonfarm people for identical items of consumption and differing availabilities of unpriced consumption distort the estimate away from the true standard of living. Hathaway estimated in 1963 that the welfare levels and labor returns of farm families would be comparable to nonfarm families if the money income of farm families equaled about 86 percent of nonfarm family income (*29*).

USDA research on the comparability of farm and nonfarm income revealed key information on the farm sector's structure. Part of that research was Grove's study of the per capita income by economic class of farm (*23*). Based on the value of 1949 sales reported to the Census of Agriculture, Grove found that farms with sales greater than $25,000 generated per capita income 2.4 times the per capita income of the nonfarm population, and farms with sales between $10,000 and $25,000 generated 1.1 times the per capita income of the nonfarm population. However, when the incomes of those on smaller farms (less than $10,000 in sales) were taken into account, the per capita income of all persons living on farms averaged about half that of the nonfarm population. The result clearly showed the relationship between farm size and income, and the fallacy inherent in comparisons based on the average of a heterogeneous farm population.

Parity Returns

Concern over how to measure parity income for commercial farms led Congress in 1965 to request USDA to conduct a study of the issue. It specifically mandated USDA to study the parity income position of farmers, to develop criteria for measuring parity income of commercial family farmers, to study the feasibility of adapting those criteria to major types of farms and selected counties, and to present its findings in a report. Because USDA recognized that agriculture was no longer a homogeneous industry, its 1967 report, titled Parity Returns Position of Farmers, included comparisons for different size classes of farms as well as the average for all farms (*67*). Unlike price and income parity, the concept of parity returns has never been given legal status by definition in farm legislation.

"Parity returns", as developed in the 1967 study, are--

> ... the equivalent returns that labor and capital employed in farming might get if they were employed elsewhere in the economy. Statistical measurements of parity returns were developed for all farms combined, for several types of farms, and for size classes of farms as indicated by the value of sales. Computation by size classes is important, because income of a farm generally varies in relation to the amount of capital and labor used in production.
>
> Parity returns for a farmer's equity capital involves: (1) the value of capital including real estate; (2) the rate of return; and (3) capital gains. These were calculated according to a "landlord standard" and a "stockholder standard."
>
> Parity returns for the labor of farm operators and unpaid members of their families require a measure of the quantity of such labor and an

appropriate wage rate. In general, a person's labor earnings are related to age, education, and sex. The relation of income to these characteristics for people in central cities was developed and used to estimate parity returns for operators of farms of different size classes and for unpaid family workers. For operators of farms with value of sales of $20,000 or more the resulting "parity wage" rate is about 105 percent of the average wage rate of manufacturing workers.

For a number of reasons, incomes in relation to parity returns vary widely among different types of farms. To estimate parity returns ratios by type of farm on a periodic basis would require enormous, detailed statistics. Thus we do not recommend attempting to apply parity returns to type of farm (67).

The prevailing (1948) definition of income parity, based on the farm family living standard, made a statement about the distribution of income among persons and approximated a welfare comparison among individuals. The 1967 report, by raising the issue of capital investment, shifted the welfare comparison from individual people to economic factors of production. It implicitly presumed that individuals who own more capital deserve more income than those who own less. Since the issue of whether people are valued more as owners of assets or simply as individuals is a matter of social policy that is decided in the public arena and articulated in public programs, the 1967 report represented a significant change in social policy.

Use of Parity in Farm Programs

Having defined parity prices in the 1933 legislation, Congress used those prices to establish both price support levels and triggers affecting commodity program operations. Parity prices have always faced a barrage of criticism and have undergone numerous modifications. The use of parity has greatly diminished, to the point where the Food Security Act of 1985 does not even mention the term. However, the permanent legislation which would provide the basis for agricultural programs when the 1985 act expires and existing legislation which continues farm programs not covered by the 1985 act do rely on parity price measures. Existing legislation mandates the continued calculation and publication of parity prices, uses them to set price supports for selected commodities, employs them to administer agricultural marketing orders, and relies on them in a number of special circumstances.

Price Support Levels

The index of prices paid for commodities, services, interest, taxes, and wage rates, known as the parity index, is used in formulas that determine the support prices for shorn wool, tobacco, and quota peanuts.

In other legislative provisions, parity prices are required in certain specific circumstances: Provisions state that the support price for wool and mohair cannot exceed 90 percent of parity, and the support price for pulled wool and mohair cannot deviate by more than 15 points from the percentage of parity at which shorn wool is supported. Under the export embargo protection provisions, loan rates must be set to 100 percent of parity on the date when an export suspension or restriction is imposed for national defense or security reasons and

must be set to 90 percent of parity when the embargo is based on short supply. Under the 1961 Foreign Assistance Act, no agricultural commodity may be procured from outside the United States for distribution under its provisions if the price in the United States for that item is less than its parity price.

Permanent legislation for dairy, wheat, cotton, feedgrains, and other basic commodity price-support programs requires USDA to base price supports on parity prices if temporary legislation expires. For example, dairy price supports, under permanent law, must be at least 75 percent but no more than 90 percent of parity. Table 1 shows selected other commodity provisions of the permanent law.

Marketing Order Regulation

Monthly parity prices are needed for administering 11 marketing orders involving interseasonal quantity controls. The commodities governed include navel oranges, grapefruit, lemons, and noncitrus fruit.

Parity prices, though not necessarily monthly ones, are essential in determining whether marketing orders are in effect for agricultural commodities. Parity is a key point to be considered in promulgating, carrying out, or terminating any marketing order. Currently USDA's Agricultural Marketing Service administers 45 marketing orders for milk and 47 marketing orders for other commodities under authority of the Agricultural Marketing Agreement Act of 1937.[6]

The boxed lists summarize legal citations to parity in current statutes and in permanent laws that are not currently in effect.

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[6] Sections 2 (7 USC 602) and 8 (7 USC 608c) of the Agricultural Marketing Agreement Act specifically refer to parity.

Table 1--Commodity program provisions under permanent legislation

Program provision	Commodity situation [1/]							
	Corn All	Dairy All	Wheat I	Wheat II	Wheat III	Cotton I	Cotton II	Cotton III
Price support as a percentage of parity	50-90	75-90	75-90[2/]	65-90[2/]	50-90[2/]	65-90	65-90	50
Nonrecourse loans	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Direct purchase	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Acreage allotment	No	No	Yes, without penalty	Yes, with penalty	Yes, without penalty	Yes, without penalty	Yes, with penalty	Yes, without penalty
Marketing quota	No	No	No	Yes	No	No	Yes	No
Paid diversion	No	Yes	No	Only if allotment is less than 55 million acres	No	No	No	No
Certificate	No	No	No	Yes	No	No	No	No
Farmer-owned reserve	No	No	Yes[3/]	Yes	No	No	No	No

[1/] The supply is normal in situation I, and no marketing referendum is held. In situation II, the supply is excessive and the marketing referendum is approved by a 2/3 vote. In situation III, the supply is excessive and the marketing referendum is not approved by a 2/3 vote. The legislation affecting dairy and corn does not provide for a marketing referendum, nor does it distinguish the supply situation.

[2/] Support level depends on the end use.

[3/] Farmer-owned reserve would be available only to farmers who comply with acreage reduction quotas.

References to Parity in Statutes Currently in Effect

Agricultural Adjustment Act of 1938, as amended: Sec. 301 (7 USC 1301) -- Defines terms related to parity.

Agricultural Adjustment Act of 1933, as reenacted and amended by the Agricultural Marketing Agreement Act of 1937: Sec. 2 (7 USC 602) and Sec. 8 (7 USC 608c) -- Requires price parity comparisons in administering marketing orders for agricultural commodities.

Agricultural Act of 1949, as amended:
Sec. 106 (7 USC 1445) -- Sets tobacco price support level.
Sec. 201 (7 USC 1446) -- Sets honey price support level.
Sec. 401 (7 USC 1421) -- Authorizes commodity price support programs.

Agricultural Act of 1954, as amended: Sec. 703 (7 USC 1782) -- National Wool and Mohair Act of 1954 -- Sets wool and mohair price support levels.

Foreign Assistance Act of 1961, as amended: Sec. 604 (22 USC 2354) -- Prevents procurement of any agricultural commodity or product outside the United States when its domestic price is less than parity.

Food and Agriculture Act of 1977: Sec. 1002 (7 USC 1310) -- Establishes loan levels at 90 percent of parity for certain agricultural commodities when the commercial export sales are suspended because of short supply determinations.

Agriculture and Food Act of 1981:

Sec. 1007 (7 USC 4103) -- Authorizes review of parity formula by the National Agricultural Cost of Production Standards Review Board.
Sec. 1204 (7 USC 1736j) -- Sets price support at 100 percent of parity when national security or foreign policy interests mandate an agricultural export embargo.

References to Parity in Permanent Law Not Currently in Effect

Agricultural Adjustment Act of 1938, as amended:

Sec. 2 (7 USC 1282) -- Declares policy of attaining parity prices and parity income.
Sec. 303 (7 USC 1303) -- Authorizes parity payments, if funds have been appropriated.
Sec. 339 (7 USC 1339) -- Computes penalty for wheat exceeding alloved acreage.
Sec. 346 (7 USC 1346) -- Computes marketing quota penalties for cotton.
Sec. 388 (7 USC 1388) -- Authorizes deduction of local, county, and State administrative expenses for Agricultural Stabilization and Conservation Service (ASCS) committees and reviev committees from parity payments.
Sec. 392 (7 USC 1392) -- Authorizes deduction of Federal, regional, State, and local ASCS administrative expenses from parity payments.

Public Lav 74, 77th Cong. (1941), as amended (7 USC 1340) -- Computes wheat marketing quota penalties.

Public Lav 518, 78th Cong. (1944): Sec. 2 (12 USC 1150a) -- Provides for compromise, adjustment, and cancellation of debts arising from loans, payments, or credit to farmers, including parity or price adjustment payments.

Employment Act of 1946, as amended by Sec. 106 of the Full Employment and Balanced Growth Act of 1978 (PL 95-523): Sec. 6 (15 USC 1022c) -- Identifies among budget priorities, farm incomes at full parity levels and full parity prices for farm commodities.

Agricultural Act of 1948, as amended: Sec. 302 (f) (7 USC 1301a) -- Identifies legal synonyms for parity prices.

Agricultural Act of 1949, as amended:

Sec. 101 (7 USC 1441) -- Sets price support levels at 70-90 percent of parity for basic agricultural commodities.
Sec. 103 (7 USC 1444) -- Sets price support level for cotton.
Sec. 105 (7 USC 1444b) -- Sets price support level for feedgrains.
Sec. 107 (7 USC 1445a) -- Sets price support level for wheat.
Sec. 201 (7 USC 1446) -- Sets price support level for milk.
Sec. 301 (7 USC 1447) -- Sets price support level for other nonbasic agricultural commodities.
Sec. 302 (7 USC 1448) -- Sets price support levels for storable nonbasic agricultural commodities.

A REVIEW OF PREVIOUS STUDIES

John D. Black's 1942 book Parity, Parity, Parity provides a comprehensive review of early criticisms of parity. His opening statement expressed the philosophy of parity:

> The farmers are asking for Parity. But Parity for Agriculture alone is impossible. Parity is a balance concept--like an apothecary's scales. If Agriculture gets more than its share and tips the scale beam downward in its favor, then the rest of society must get less than before. The balance in this case, however, has three scale pans instead of two, one for Agriculture, one for Labor, and one for Capital. Hence three Parities must be considered--Parity for Agriculture, Parity for Labor, and Parity for Capital (6).

Although parity was the subject of his book, Black's object was to review the Federal Government's larger effort of regulating the prices of farm products, along with wages and the prices of other products. He examined farm and city incomes, parity by commodities, the geography of parity, the farmer's interest in wages, inflation and the farmer, and price fixing and price manipulation. He also presented several alternative standards of parity and discussed production cost concepts.[7]

Post-World War II Criticisms

The resurgence of farm prices during World War II brought about price controls for farm products and other commodities. Parity prices were used as ceilings to administer the price control program. Under the 1938 definition, farmers received 119, 131, 129, and 138 percent of parity income during 1942-45. Toward the end of the war, it was apparent that farmers would have received parity incomes or more, even without parity prices for their products. The Steagall Amendment of 1941 set price support at 90 percent of parity for all commodities whose production was expanded by the war effort. The amendment remained in effect until December 31, 1948, 2 years after the declared end of the war.

Even as World War II was drawing to a close, intellectuals began to discuss the structure of society and American social policy in peacetime. In 1945, the American Farm Economics Association (AFEA) sponsored an essay contest on farm price policy. The winning essays were published in the November 1945 issue of the Journal of Farm Economics.

There was virtually unanimous agreement among winning analysts that price parity hinders the functioning of a proper pricing system. Nicholls and Johnson summarized the views presented by the 18 winning essayists (47):

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[7] Although parity, or "fair exchange value", was the basis of price supports in the Hope-Norbeck bill which became the 1933 Agricultural Act, its practical alternative at that time was to base farm price supports on the cost of production, whose champion was Senator Norris. Government support for the cost of production idea during 1923-33 arose primarily from the U.S. Tariff Commission, while nongovernment backing came from the American Society of Equity, Farmers' Union, and the so-called "left-wing" farm organizations.

* Price relationships of 1910-14 grossly distort the current pattern of consumer choices.
* Cost relationships among commodities and regions in that time differ greatly from current relationships, freezing resources into an anachronistic design.
* Government actions to realize parity goals have insulated agriculture from the socially beneficial effects of a sensitive pricing system.
* Necessary shifts of population out of agriculture are prevented.
* Raising prices above free-market levels cannot raise inadequate farm incomes of noncommercial farmers.
* Parity fails to reflect the prevailing grade, geographic and seasonal price differentials.
* Parity would price products out of foreign and domestic markets resulting in either surpluses or production and marketing quotas.

The association also impaneled a committee on parity concepts. The committee reports presented an outline of price policy for postwar agriculture and suggested a redefinition of parity price and parity income (*2, 3, 87*). The AFEA committee set forth a slightly different set of weaknesses and limitations of the parity formula (*2*):

* By adopting a historical base period, the parity formula freezes a functional and otherwise self-adjusting price mechanism.
* In allocating productive resources and people, the only alternative to relative prices is the direct order of the government.
* The parity formula ignores the progress made in farm technology which has reduced the costs of producing some crops much more than others.
* The formula makes no allowance for the improvement in quality of goods and services bought by the farmer.
* The high support prices based on parity gave the farmer incentive to produce on fewer acres as much as his too-easily underrated ingenuity and resourcefulness would allow.
* The parity formula has subsidized excess production simply to fill public granaries.
* Manufacturers of substitutes will be greatly encouraged by the fixed price of farm crops like cotton.
* Fixed parity prices do similar harm in the foreign market by pricing American exports out of the range of importing countries.

Congress responded to these analyses and criticisms and political climate of the time by changing the legal definitions of parity price and parity income in the Agricultural Adjustment Act of 1948. The law provided for "transitional" parity prices in order to smooth the changeover from the old definition to the new during the interval from 1950 to 1956.

Parity Improvements Report of 1957

An undercurrent of dissatisfaction with the parity concepts (*53, 58, 59, 65, 86*) prompted the Congress in the 1956 Agricultural Act to order the USDA Secretary to make "a thorough study of possible methods of improving on the parity formula and report thereon, with specific recommendations, including drafts of necessary legislation to carry out such recommendations." The 1957 report, Possible Methods of Improving the Parity Formula, addressed the question of what kind of

formula might be most useful and proposed a number of changes to parity prices (66).

The three basic formulas on which most suggestions for parity calculations rest rely on general comparisons of the purchasing power of commodities between different base periods, specific commodity indexes or cost estimates, and prices or resource returns that yield specified incomes for particular kinds of farms. The report recommended continued use of the general commodity purchasing power comparisons.

The report discussed five changes in parity price formulas:

* Moving to different base periods.
* Devising separate parity indexes for individual commodities.
* Adjusting the prices to reflect gains in production efficiencies.
* Reflecting the costs of price stabilization programs in the parity prices.
* Shifting to a parity income formula, based on either historical income ratios or on direct farm/nonfarm comparisons.

Although the alternatives were discussed in depth, the report's only specific recommendation was to continue using a 10-year moving average as the base period for parity prices.

Parity of Income and Resource Returns

By the mid-1960's, it was realized that income parity could be achieved even with farm commodity prices substantially below parity levels. Income parity became an issue for analysis, with farm size figuring as an important dimension of the problem (25).

In 1949, when per capita income of all persons on farms was half that of the nonfarm population even though prices were at parity levels, farms reporting sales over $10,000 to the Census of Agriculture showed per capita incomes greater than the nonfarm population (23). Total family income on farms with 1959 sales greater than $5,000 was nearly the same as that of nonfarm families, despite prices at 80 percent of parity (42). Both studies found that larger farms realized more income than smaller farms and both recognized that the capital invested in the larger farms exceeded funds invested in smaller ones.

Research in the late 1950's and early 1960's sought to estimate the income levels necessary for farm capital to earn a rate of return comparable to that of nonfarm capital and to provide farmers and farmworkers a wage comparable to that of nonfarm workers with similar age and education. The 1967 USDA report, Parity Returns Position of Farmers, designated those comparable rates of return as "parity returns" to distinguish them from other concepts of parity income (67). An Iowa State study (17, 56) used USDA costs and returns data (19, 20, 71) for various types of farms to estimate a time series of parity returns indicators for 1930-57.

Masucci estimated parity returns by sales class at the U.S. aggregate level with an illustration of the position of individual farm types in 1961 (42). Gross income in 1961 would have to increase 9 percent to convey parity returns to

farms with sales over $5,000, but would have to increase 74 percent to provide parity returns to farms selling $2,500 to $4,999 worth of products and would have to increase 193 percent to convey parity returns to the smallest class of farms. At that time, prices were about 80 percent of parity.

The report on parity returns position of farmers examined the situation in 1959, 1964, and 1966 using both a "landlord" and a "stockholder" standard of return to land and capital and taking a "human capital" approach to the valuation of labor returns (67). In 1966, farms with sales over $20,000 realized parity returns or higher, while farms selling less than $5,000 realized only 30-40 percent of parity returns. Using the "stockholder" standard and taking the sector as a whole, farmers earned 96 percent of what they would have realized by selling their land, investing in common stocks, and working at a nonfarm job. The situations in 1959 and 1964, and in 1966 under the "landlord" standard, were less favorable.

Paarlberg and Jacobson examined parity of net worth in a 1966 article (*32*). They argued that farmers prefer future consumption over present consumption to a greater extent than nonfarmers, and consequently have amassed more net worth than nonfarm people.[8] Parity of net worth would be more easily attained by taxing away the additional net worth of farmers, they contended, than by making financial grants to nonfarmers.

Cost of Production

In 1933, cost of production was the major alternative to parity as a basis for setting farm price and income supports. Even at that time, the idea of cost of production had considerable history. For example, wheat prices were supposed to have been set on that basis in World War I, as were milk prices in the New York milkshed. Farm Bureaus in Iowa and South Dakota set up agencies in the 1920's to compute the production cost for farm products. Great Britain enacted a law fixing the prices of farm products at the unit cost of production for a brief period in the early 1920's.

Confusion has arisen in discussions of cost of production because the term is often used in several senses. Black distinguished between "historical costs," "normative costs," and "necessary costs" of production (6). "Historical cost" is the sum actually spent on some production already completed, with items priced and depreciated on the basis of what actually was paid for them. "Normative cost" is what will support the kind of living producers want, or what somebody thinks they should have. "Necessary cost" is the sum that will have to be spent in the current production year to produce a target quantity.

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[8] A flaw in their argument is that the net worth of farmers has accrued more from asset stock revaluation than from the reduction of the consumption flow necessary to repay farm debts. If consumption flows were in fact reduced in order to build up the capital stock, then farmer preferences would have been revealed. The fact remains, however, that the net worth per farm or farmer, for the sector as a whole, greatly exceeds the net worth of nonfarm households or individuals.

In 1966, Ernest Grove (24) observed that the comparability of returns concept used by Masucci (42), and later by the 1967 USDA report (67), was in fact a "normative" cost of production concept to which income parity was originally opposed, and that it was erroneous to equate the concepts.

The 1973 Agriculture and Consumer Protection Act directed the Secretary of Agriculture to conduct a study of the costs of producing wheat, feed grains, cotton and dairy commodities. Since 1974, USDA has published annual estimates of the costs of producing major commodities.

National Average Cost

In 1977, Sharples and Krenz suggested that production cost replace parity as a basis for setting price supports (55). They suggested using the U.S. average total cost of production but recognized the possibilities of a land price spiral if the total land charge were included in the cost estimate. Their article made no mention of the discussion of separate parity indexes for individual commodities in the literature on parity, nor of the long history of the production cost concept in farm policy.

Groenevagen and Clayton proposed a fixed markup over the U.S. average variable costs of production as the basis for setting price support levels (21). The proposed markup was a fraction of the difference between price and variable costs, averaged over recent years.

An inherent difficulty with using the national average cost as an indicator is that about half of all producers have costs in excess of that level. A second difficulty occurs when the support level guarantees some return to nonpurchased factors of production, which becomes capitalized into the price or opportunity cost of the resource which, in turn, leads to the land price spiral mentioned earlier. These difficulties are associated with any price support based on aggregate averages.

Marginal Social Cost

Both of these difficulties can be remedied by basing support levels on the average variable cost of production (excluding ownership costs of land and capital, overhead, and the operator's own and family labor) in the region with the highest costs. This basis of support approximates the costs of foregone opportunities incurred by society to attain an additional unit of that commodity, its "marginal social cost."[9]

The marginal social cost concept rests on a different premise than traditional price supports. Traditional price supports were intended to raise market prices above equilibrium levels and to thereby enhance farmer incomes. The marginal social cost is meant to act as a safety net, cushioning downside financial risks while permitting market price equilibrium to occur in most years. Under the marginal social cost concept, income enhancement is separated from risk protection.

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[9] The marginal social cost concept identified here is essentially the same as the "necessary cost" concept identified by Black (6).

THE CASE FOR CHANGING PARITY PRICE FORMULAS

The structure of agriculture in the mid-1980's differs radically from the structure of agriculture in the 1930's when parity was enacted, and even more radically from the agriculture of the 1910-14 period representing the purchasing power base. In the 1930's, agriculture existed in a closed economy, but in the 1980's much of agriculture produces for export and needs prices in tune with world markets. The income problems of the 1930's were associated with the average farm income relative to nonfarm incomes, while the income problems of the 1980's relate more to the uneven distribution of incomes within a heterogeneous agricultural sector than to a low average compared with the rest of the economy

The price relationships of the 1910-14 base period were quite favorable for the farm sector as a whole. That was the "Golden Age of Agriculture" (*12*). The only recent experience of farm prices nearing parity was during 1973-75, when agriculture was considered out of balance with the rest of the U.S. economy.

The structure of agriculture has changed; the problems facing agriculture have changed; and the base period price relationships are outdated. Unless the parity price formulas reflect a current standard of equity, parity prices cannot address the problems of contemporary agriculture.

Postparity Structural Changes

One of the rationales for parity prices is that establishing prices at parity levels would restore incomes of farmers to relationships that prevailed in the base period for parity. Parity price comparisons, however, overlook the very important dimension of quantity. To illustrate this key point, we will examine output in the parity base period and subsequent changes in the production of major commodities per farm actually producing them.

Farm Numbers

An important structural change affecting U.S. agriculture was the decrease in the number of U.S. farms over the last half century. It was not until 1950 that the number of farms counted by the Census of Agriculture dipped below the number counted in 1900. Farm numbers rose from 5.7 million in 1900 to nearly 6.5 million in 1920, a period which includes the base period for the parity calculations. The 1920's saw a slight decline in farm numbers, but the Great Depression caused a return to the farm that resulted in a high of more than 6.8 million farms in 1935. From that peak, farm numbers dropped by 1 million between 1935 and 1945 and by another million between 1945 and 1954. The next decrease of 1 million farms took only 5 years. After 1974, the pace of change slowed down to the point where the counts have remained fairly stable for the last three censuses (table 2).

Agriculture at the turn of the century was extremely diversified compared with today. In 1900, or the earliest Census of Agriculture estimate, nearly four-fifths of all farms reported that they raised corn, milk, hogs, chickens, and eggs and owned draft horses (figs. 1 and 2). Nearly one-fourth of all farms harvested cotton. In 1982, only one-third of the farms harvested corn, less

than one-fifth owned horses (which were used for pleasure rather than work), one-seventh owned hogs, one-eighth owned milk cows, and less than one-tenth owned chickens. In 1930, nearly 2 million farms produced cotton, representing almost one-third of all farms. But in 1982, cotton was produced on less than 1 in 50 farms, amounting to only 38,182 farms (see tables 3 and 4).

By contrast, only 348 farms harvested soybeans in 1910, compared with approximately half a million in every agricultural census since 1954. Nearly one-fourth of all farms now harvest soybeans. Since 1930, farms harvesting wheat have constituted a relatively stable share, accounting for about one-fifth of all farms. A slightly rising share of the total number of farms harvest tobacco, amounting to about 8 percent of all farms in 1982.

Table 2--Number of farms, census years 1900-82

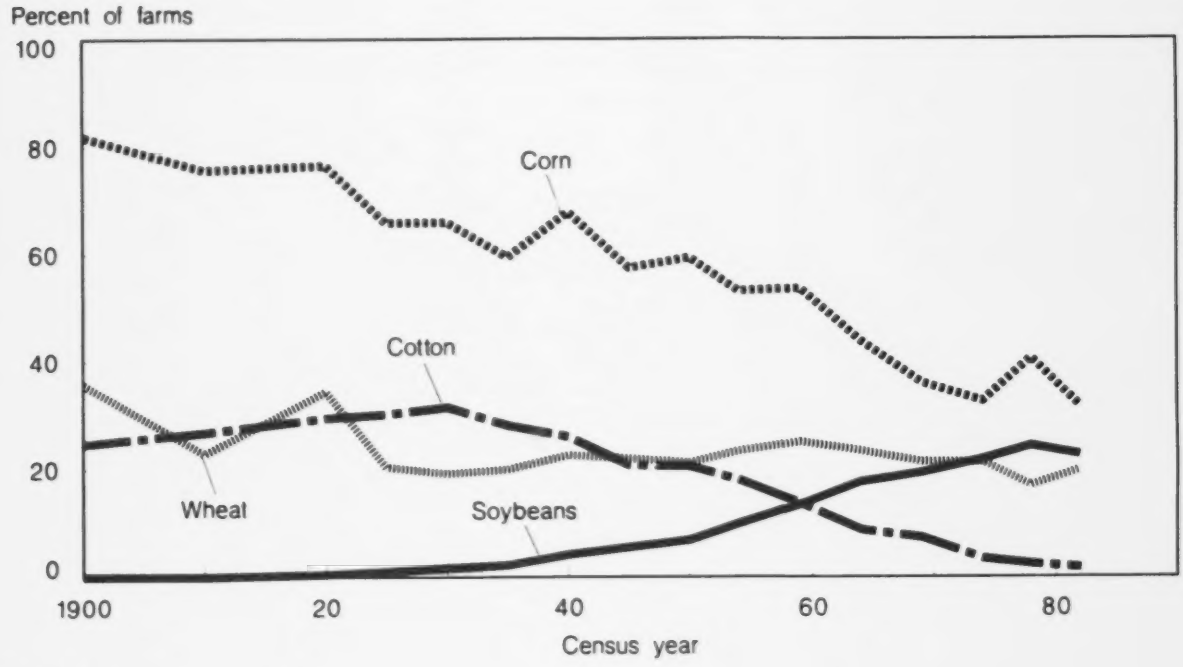
Census year	All farms	Census year	All farms
	Number		Number
1900	5,737,372	1950	5,388,437
1910	6,361,502	1954	4,782,416
1920	6,448,343	1959	3,710,503
1925	6,371,640	1964	3,157,857
1930	6,288,648	1969	2,730,250
1935	6,812,350	1974	2,314,013
1940	6,102,417	1978	2,257,775
1945	5,859,169	1982	2,240,976

Note: These are census numbers, not corrected for undercounts or overcounts.

Source: (*80*)

Figure 1

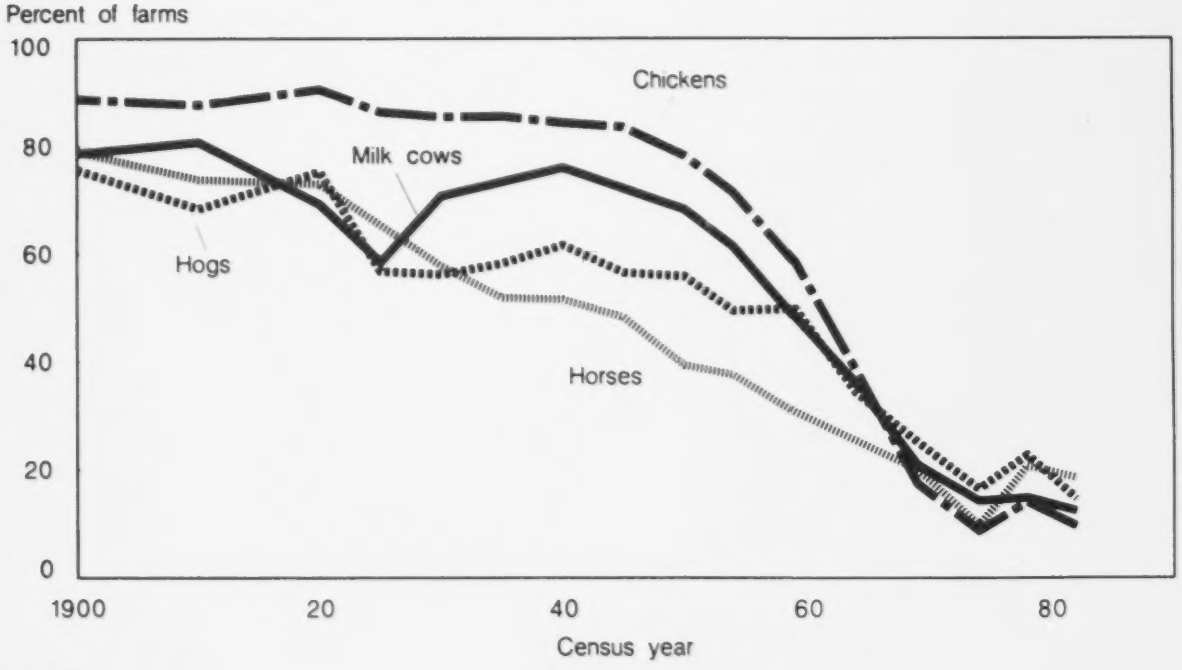
Crop Diversification Trends



Source (80)

Figure 2

Livestock Diversification Trends



Source (80)

Table 3--Selected crops: Number of farms reporting harvested acreage, census years 1900-82

Census year	Any wheat	Winter wheat	Spring wheat	Corn for grain	Cotton	Tobacco	Sorghum for grain	Soybeans for beans
				Thousands				
1900	2,053.9	NA	NA	4,697.5	1,418.6	308.3	19.8	NA
1910	1,458.7	1,174.0	NA	4,813.2	1,714.1	326.9	97.6	0.3
1920	2,225.1	1,740.3	566.8	4,936.7	1,905.9	448.6	129.9	31.1
1925	NA	1,032.6	267.9	4,195.9	1,931.3	396.4	NA	NA
1930	1,208.4	940.7	NA	4,148.8	1,986.7	433.0	167.7	NA
1935	1,363.7	1,150.9	227.1	4,056.0	1,920.1	422.2	159.9	148.1
1940	1,385.8	1,124.2	279.3	4,141.0	1,589.7	498.3	206.2	253.8
1945	NA	988.0	NA	3,369.8	1,217.5	490.6	182.0	NA
1950	1,147.7	932.3	215.4	3,200.3	1,108.6	531.9	142.0	369.8
1954	NA	837.0	NA	2,543.4	864.1	511.5	149.5	471.7
1959	931.2	767.4	163.8	1,989.6	509.5	416.6	223.4	499.7
1964	739.7	631.2	119.5	1,382.8	274.0	255.2	158.4	560.2
1969	583.6	NA	NA	985.6	199.8	276.2	135.9	529.8
1974	495.2	NA	NA	757.2	78.9	150.1	139.7	507.6
1978	383.0	NA	NA	918.5	53.7	203.0	136.7	550.3
1982	445.7	NA	NA	714.7	38.2	179.1	93.6	511.0

NA = Not available.

Source: (*80*).

Table 4--Number of farms reporting one or more livestock, by species

Census year	Beef cows	Milk cows	Hogs	Chickens	Turkeys	Sheep	Goats	Horses
				Thousands				
1900	NA	4,514.2	4,336.0	5,096.3	NA	763.5	77.5	4,532.0
1910	1,445.1	5,141.4	4,353.2	5,580.8	871.1	610.9	82.8	4,695.1
1920	1,041.4	4,461.8	4,852.4	5,839.5	670.8	538.6	107.3	4,706.8
1925	NA	3,728.6	3,618.6	5,505.6	NA	430.7	91.4	NA
1930	416.0	4,453.6	3,536.8	5,375.6	NA	583.6	113.0	3,633.1
1935	NA	NA	3,971.1	5,833.1	676.1	635.4	157.6	3,536.6
1940	555.1	4,645.0	3,767.9	5,152.4	443.4	585.0	127.3	3,149.7
1945	NA	NA	3,313.9	4,900.9	NA	457.0	134.5	2,828.4
1950	NA	3,681.6	3,013.5	4,218.9	131.8	320.4	29.9	2,121.6
1954	NA	2,935.8	2,365.7	3,418.2	83.5	361.0	29.2	1,799.9
1959	NA	1,792.4	1,848.8	2,172.3	51.7	342.0	26.5	1,139.0
1964	NA	1,133.9	1,081.4	1,210.7	NA	234.8	20.4	NA
1969	NA	568.2	686.1	471.3	NA	170.9	19.2	547.2
1974	713.3	328.2	379.0	201.5	6.9	81.2	6.0	225.3
1978	1,032.2	333.2	511.8	315.0	14.7	97.9	28.2	467.2
1982	957.1	277.5	329.5	215.7	14.1	101.4	42.7	416.6

NA = Not available.

Source: (*80*).

Farm Size

As farm numbers declined, farm size increased. Improved technology raised the yields of the productive resources on those farms, speeding up the increase in output per farm. Again, the rate of progress has not been uniform since 1900. From 1900 to 1940, per-farm output of corn, cotton, and tobacco remained virtually unchanged (table 5). In 1982, output of tobacco per farm increased 4 times, output of corn 20 times, and output of cotton 40 times, compared with per-farm output in 1940. Wheat production per farm doubled between 1900 and 1940, and by 1982 was 11 times the 1940 amount. Output growth reflected both higher crop yields and larger acreage per farm.

Livestock production follows a similar pattern (table 6). Between 1910 and 1982, the inventory of milk cows per dairy farm increased 10-fold, the number of hogs per farm increased 15-fold, and the number of chickens per farm increased

Machinery gradually replaced draft animals in U.S. agriculture. Farmers operate a coal-powered wheat thresher in 1934.

Table 5--Selected crops: Total production and production per farm, census years 1900-82

Census year	Total production				Production per farm			
	All wheat	Corn for grain	Cotton	Tobacco	All wheat	Corn for grain	Cotton	Tobacco
	--- 1,000 bushels ---		1,000 bales	1,000 pounds	----- Bushels -----		Bales	Pounds
1900	599,315	2,686,440	10,124	851,980	291.8	571.9	7.137	2,763
1910	625,467	2,553,273	11,609	1,142,320	428.8	530.5	6.772	3,494
1920	843,277	2,695,085	13,429	1,509,212	379.0	545.9	7.046	3,364
1925	668,700	2,382,288	16,105	1,376,008	514.2	567.8	8.339	3,472
1930	886,522	1,757,297	13,932	1,647,037	733.7	423.6	7.013	3,804
1935	628,227	2,001,367	10,638	1,302,041	460.7	493.4	5.540	3,084
1940	814,646	2,206,882	12,566	1,460,441	587.9	532.9	7.905	2,931
1945	1,107,623	2,577,449	9,015	1,991,108	NA	764.9	7.404	4,059
1950	1,019,344	2,764,071	10,014	2,029,557	888.1	863.7	9.033	3,816
1954	983,900	2,707,913	13,697	2,243,735	NA	1,064.7	15.850	4,387
1959	1,117,735	3,824,598	14,558	1,796,415	1,200.3	1,922.3	28.571	4,312
1964	1,283,371	3,484,253	15,182	2,227,932	1,735.1	2,519.8	55.419	8,730
1969	1,442,679	4,687,057	9,990	1,803,272	2,472.0	4,755.4	50.005	6,529
1974	1,781,918	4,701,402	11,540	1,989,728	3,598.5	6,208.6	146.185	13,255
1978	1,775,524	7,267,927	10,856	2,024,820	4,636.2	7,913.0	202.092	9,976
1982	2,764,967	8,235,101	11,963	1,994,494	6,203.1	11,522.5	313.307	11,136

NA = Not available.

Sources: (*70, 80*).

more than a 35-fold, with most of that change taking place since 1954.[10] The 1978 Census of Agriculture indicates that more than half of the sales of dairy products came from about one-sixth of the farms selling dairy products, more than half of the sales of hogs came from about one-eighth of the farms marketing hogs, and more than one-half of the sales of poultry and eggs came from only about 3 percent of the farms selling poultry products (*80*).

Table 6--Selected livestock: U.S. total and average per-farm inventory, as of January 1 1/

Census year	U.S. total inventory on farms			Average inventory per farm		
	Milk cows	Hogs	Chickens, less broilers	Milk cows	Hogs	Chickens, less broilers
	Thousands			Number		
1900	16,544	51,055	233,598	3.7	11.8	45.8
1910	19,450	48,072	280,341	3.8	11.0	50.2
1920	21,455	60,159	359,537	4.8	12.4	61.6
1925	22,575	55,770	409,291	6.1	15.4	74.3
1930	23,032	55,705	468,492	5.2	15.8	87.2
1935	26,082	39,066	389,956	NA	9.8	66.9
1940	24,940	61,165	438,288	5.4	16.2	85.1
1945	27,770	59,373	516,497	NA	17.9	105.4
1950	23,853	58,937	456,549	6.5	19.6	108.2
1954	23,896	45,114	396,776	8.1	19.1	116.1
1959	20,132	58,045	387,002	11.2	31.4	178.2
1964	17,647	56,757	382,262	15.6	52.5	315.7
1969	12,550	57,046	422,096	22.1	83.1	895.6
1974	11,297	54,693	394,101	34.4	144.3	1,955.5
1978	10,896	60,356	396,933	32.7	117.9	1,260.1
1982	11,012	53,935	378,609	39.7	163.7	1,755.6

NA = Not available.

1/ December 1 inventories for hogs and chickens, 1969-82.

Sources: (*70*, *80*).

[10] If the divisor had been the number of commercial-sized operations rather than the total number of farms reporting each species, an even more dramatic increase would be seen.

Parity Value of 1910-14 Production

Equitable income for producers is unrelated to commodity price parity. Moreover, the changes in farm size, structure, and productivity over the last 75 years are ignored by parity prices. When Congress defined parity income in the 1930's, it believed that restoring 1910-14 purchasing power to the commodities produced by farms about the same size as those in 1910-14 would generate an equitable level of income to those producers. What, then, is the per-farm income effect of receiving parity prices on the 1910-14 per-farm production levels in the 1980's?

Using the average of the 1900, 1910, and 1920 production per farm as the parity quantity, the prices, quantities, and values in table 7 would represent parity in 1985.

By contrast, the situation represented by the 1982 average price and the production per farm estimated by the 1982 Census of Agriculture portrays more production and considerably higher gross receipts, even though the per unit prices are roughly only 50 percent of parity (table 8).

This is one way to show that the single dimension of price parity does not reflect the multidimensional adjustments that agriculture underwent in the last 75 years. Few farmers would prefer to get 1910-14 real prices on 1910-14 real production per farm when the alternative is to receive today's prices on today's production per farm.

Whether the 1987 value of 1987 production per farm generates a more equitable income than the parity value of 1910-14 production per farm is an issue of social policy outside the scope of this report. Within the context of agricultural legislation, though, "parity income" is equitable.

Table 7--Selected crop farms: Parity value of 1910-14 production

Commodity	1910-14 production base		
	Parity price per unit (10/85)	1910-14 per-farm quantity	Per-farm value
	Dollars	Bushels or pounds	Dollars
Wheat	6.96	366.5	2,551
Corn	5.08	549.4	2,791
Cotton	1.23	3,352.8	4,124
Tobacco, flue-cured, types 11-14	2.22	3,207.0	7,120

Price and Income Situation

Today's commodity prices are at less than parity levels. But, prices for farm commodities need not be at parity levels to ensure efficient and profitable production. Net incomes vary substantially by size of farm, with the largest farms receiving more than parity incomes. Relatively small price changes can overcome relatively large income gaps for commercial farms. However, only huge price changes or policies unrelated to price can overcome the income deficiencies of the smallest farms.

Price Trends

To put farm price levels in historical persective, we show the indexes of prices received and paid by farmers, and the parity ratio for 1910-85 (figs. 3 and 4). Movements on the graph identify periods of war and peace, of boom and recession, and of deep economic depression.

Prices received exceeded 100 percent of parity during World War I, World War II, and the Korean Conflict. In the years immediately after World War II, the same was true because the Steagall Amendment was in effect. The most recent example of farm prices approaching parity levels was in 1973 and 1974, a response to the surge in crop exports. That situation resulted from the floating of the U.S. dollar, its subsequent devaluation, and the Soviet decision to import grain. High interest rates on top of increasing rates of farm debt, an overvalued dollar in international exchange, and sagging exports were the major factors behind the slump of the early 1980's.

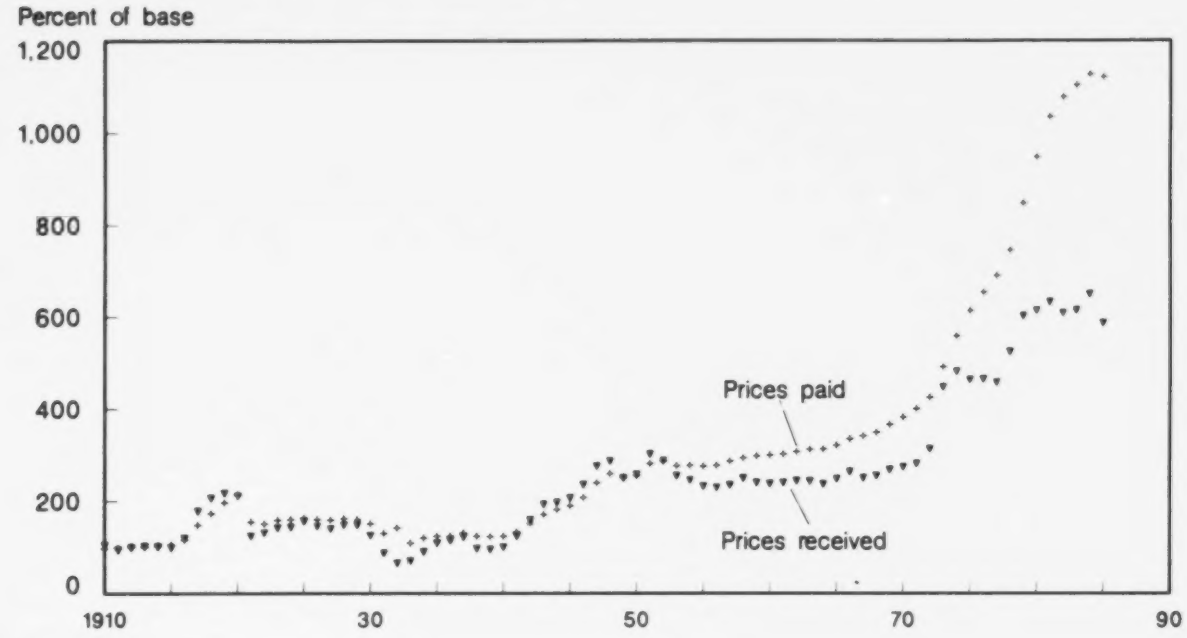
Except for the wartime aberrations, the price trend over the last 75 years has been toward a smaller percentage of parity each year. The eras in which the parity ratio held steady or rose corresponded to the periods in which farm numbers increased, indicating that farming was more attractive than jobs in the nonfarm economy. Any attempt to restore farm prices to parity levels (more than 75 percent higher than currently received) or even to reverse the downtrend in the parity ratio would attract more resources to agriculture than are needed to efficiently produce for current demand.

Table 8--Selected crop farms: 1982 value of 1982 production

Commodity	1982 production base		
	1982 season average price per unit	1982 per-farm quantity	Per-farm value
	Dollars	Bushels or pounds	Dollars
Wheat	3.550	6,203.1	22,021
Corn	2.680	11,522.5	30,880
Cotton	.594	150,387.4	89,330
Tobacco, flue-cured, types 11-14	1.785	11,136.0	19,878

Figure 3

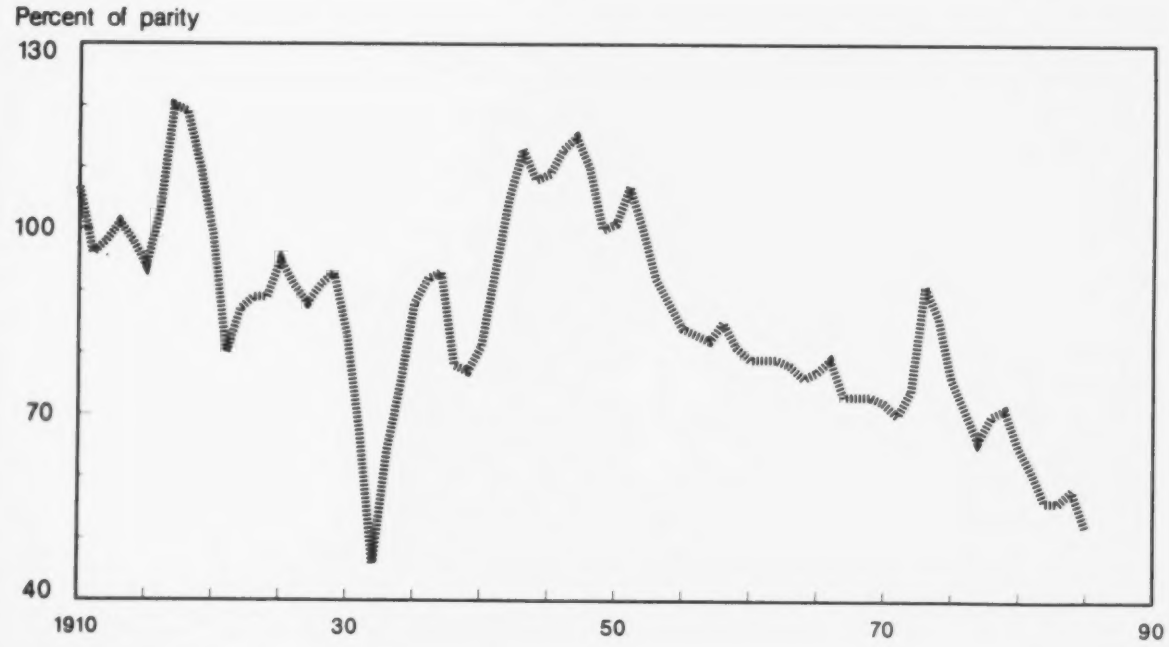
Prices Received and Paid by Farmers[1]



1/ 1910-14 is the base period.
Source: (70).

Figure 4

Parity Ratio[1]



1/ 1910-14 is the base period.
Source: (70).

Income Trends

Parity income centers on the relationship between incomes of farm and nonfarm people. Two approaches to establishing parity income have appeared in national legislation. One is to use a historical ratio of incomes between farmers and nonfarmers. The other is to compare actual equality of incomes or living standards between the two groups. Under the first approach, the historical ratio is preserved and simply brought forward to the present. If, for example, the per capita income of farm people was 80 percent of the per capita income of nonfarm people in 1910-14, then parity income would result whenever the per capita farm income exceeded 80 percent of the per-person nonfarm income. The second approach requires that the farm income per capita exceed 100 percent of the nonfarm income regardless of the fraction that prevailed in 1910-14.

The two approaches yield very different results. The historical ratios of incomes between farm and nonfarm populations, which were inherent in the 1936 and 1938 legislation, indicate that incomes in the agricultural sector have been at or above 1910-14 parity levels for most years since World War II. Direct comparisons, on the other hand, show that although historically farm income fell short of the nonfarm level, the total income of farm operator families (farm plus off-farm revenues) on average, exceeded the median income of all U.S. families since 1963 (table 9).[11]

A closer look at farm operator family incomes by farm sales category reveals a more complete picture. Even though the average farm plus nonfarm income of farm families has exceeded the median income of all U.S. families since 1963, the statistics show that in every year there have been farms with total income less than the national average (table 10). Farms in the largest size categories earn incomes substantially greater than the U.S. median family income. The largest income deficits accrue to farms that are smaller than commercial-sized but not the smallest farms by sales. In the smallest sales classes, off-farm incomes are substantially larger than those of the mid-sized farmers. Farms in the $500,000-and-over sales class have the largest off-farm income per farm.

Achieving Income Parity

Income parity was always linked to size of farm. Farms with larger sales generated higher incomes than those with low sales volumes; high-sales farms also consistently generated incomes greater than those of the median American family. However, one key factor has changed over time: the size of farm that is necesary to generate parity income steeply increased. In the early 1960's and in 1973, farms selling at least $10,000 in products could realize parity income. From 1969 to 1974, farms selling $20,000 or more achieved income parity on

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[11] In any income comparisons, the consideration of what is included in income and the make-up of the population are major factors influencing the outcome of the comparisons. In particular, the relatively large number of farms with small sales volumes biases average farm income as a measure of the income of the farmers who produce the bulk of farm output. Moreover, the nonfarm income of farmers varies substantially by sales class of farms (*1*).

average. From 1975 to 1979, farms needed to sell at least $40,000 in order to generate parity-level income. Since 1980, $100,000 in sales have been necessary to provide the operator's family with an income equal to or greater than the median U.S. family.

Table 9--Income comparison: All U.S. families and farm operator families, 1960-83

Year	Median money income of all families (all races)	Total income (farm and nonfarm) of farm families	Ratio of farm family income to income of all families
	-------- Dollars --------		Percent
1960	5,620	4,946	88.0
1961	5,735	5,434	94.8
1962	5,956	5,782	97.1
1963	6,249	6,204	99.3
1964	6,569	6,638	101.1
1965	6,957	7,325	105.3
1966	7,532	8,574	113.8
1967	7,933	8,279	104.4
1968	8,632	9,008	104.4
1969	9,433	10,268	108.9
1970	9,867	10,848	109.9
1971	10,285	11,287	109.7
1972	11,116	13,955	125.5
1973	12,051	19,746	163.9
1974	12,902	20,413	158.2
1975	13,719	18,266	133.1
1976	14,958	19,365	129.5
1977	16,009	18,267	114.1
1978	17,640	23,207	131.6
1979	19,587	25,709	131.3
1980	21,023	26,503	126.1
1981	22,388	25,849	115.5
1982	23,433	26,794	114.3
1983	24,580	29,048	118.2

Sources: (*74, 82*).

Table 10--Income parity by sales class: Income of farm operator families as a percentage of median income of all families, 1960-83

Year	Sales class (dollars)								
	500,000 and over	200,000 to 499,999	100,000 to 199,999 1/	40,000 to 99,999 2/	20,000 to 39,999	10,000 to 19,999	5,000 to 9,999	2,500 to 4,999	0 to 2,499
	Percent								
1960	NA	NA	NA	346.1	173.6	113.0	85.2	67.2	63.0
1961	NA	NA	NA	360.6	177.6	111.1	90.3	71.7	67.8
1962	NA	NA	NA	346.5	170.6	115.2	90.3	72.5	70.9
1963	NA	NA	NA	334.2	163.5	112.2	90.4	73.6	74.8
1964	NA	NA	NA	313.9	163.2	114.2	92.6	75.4	77.0
1965	NA	NA	584.0	270.5	159.3	112.8	92.6	76.2	80.7
1966	NA	NA	687.6	289.8	170.3	116.3	94.0	79.3	83.0
1967	NA	NA	469.4	237.1	146.6	105.5	89.7	78.6	82.4
1968	NA	NA	458.5	226.2	143.4	104.0	89.2	79.1	82.3
1969	NA	NA	1,110.2	264.9	149.9	97.9	80.3	64.8	69.8
1970	NA	NA	1,075.0	241.8	139.7	96.0	78.3	65.3	73.3
1971	NA	NA	948.8	223.7	131.5	92.6	77.8	67.4	75.8
1972	NA	NA	979.1	238.3	139.9	99.6	84.3	74.6	81.4
1973	NA	NA	1,062.6	247.3	143.7	105.5	93.5	88.1	93.4
1974	NA	NA	961.9	197.8	123.1	97.0	92.7	92.2	98.6
1975	4,486.4	782.0	355.5	161.8	90.3	76.5	78.2	82.6	85.1
1976	3,952.7	650.9	302.0	141.2	84.3	77.5	79.8	82.5	86.0
1977	3,476.8	529.5	249.7	119.7	73.3	70.2	72.3	72.4	76.7
1978	3,487.9	530.4	257.7	128.6	80.1	77.5	79.0	77.3	81.8
1979	2,959.6	422.8	203.0	104.3	74.2	80.9	84.5	82.5	89.9
1980	2,936.2	362.0	165.7	84.3	65.4	77.1	83.2	82.7	91.1
1981	2,750.3	298.6	132.2	67.5	57.4	72.6	80.8	81.6	90.5
1982	2,594.1	293.9	135.0	70.4	58.0	70.9	78.5	78.8	87.2
1983	2,425.5	312.6	156.5	89.1	67.1	74.5	80.9	79.4	86.6

NA = Not available.

1/ In 1965-74: $100,000 and over.
2/ In 1960-64: $40,000 and over.

Sources: Computed from table 9 and appendix table 1.

Although part of that increasing size dimension reflects inflation of nominal prices for farm products, more bushels of corn or pounds of pork are needed in 1986 to generate the median family income than were needed in 1960. The rise in the standard of comparison demands a higher level of output per farm.[12]

Simply raising farm product prices does not produce parity income for all farmers. Higher product prices confer uneven income gains to producers: small percentage increases in cash receipts convey large increases in the total net income of large farms but virtually no increases in the incomes of small farms. For instance, to raise the average total income of farmers in the $40,000 to $99,999 sales class to 100 percent of the median income of all U.S. families (from 89.1 percent in 1983), prices received for their commodities in 1983 would have to rise by 3.4 percent (table 11). That rate of increase would boost the incomes of operators in the $200,000 to $499,999 sales class by $11,493 in 1983, or 15 percent (table 12). On the other hand, the income of operators in the $20,000 to $39,999 sales class would rise by only $594 in 1983, or 3.2 percent of their average total income. That same 3.4-percent price increase applied to the cash farm income of those in the $500,000 and over sales class would increase their incomes by $62,202, or 10.4 percent of their 1983 total income.

The price increase necessary to raise the total income of the farms with sales less than $40,000 to the parity level is so large that it would push the cash farm income of the average farm over the limit defining its sales class. The 22.8-percent increase necessary to raise the net income of farms with sales of $20,000 to $39,999 to parity with nonfarm households would increase the average farm's cash income to $43,566. Farms selling less than $5,000 worth of products would have to more than double their cash receipts in order to erase the difference.

Summary. These observations on price-income interplay can be summarized using the concept of price elasticity of farm family income (fig. 5). The elasticity of farm family income is the percentage change in total family income resulting from a 1-percent change in the prices received for farm commodities, with no change in production, expenses, or nonfarm income. A 1-percent price rise increases total revenue only 1 percent, while net revenue increases by more than 1 percent because expenses remain unchanged. Farm family income would increase by a percentage equal to the change in net farm income divided by the sum of farm plus nonfarm income.

The elasticity depends on profit margins and off-farm income which vary by size of farm. For the smallest farms, nonfarm income makes up such a large percentage of the total family income that farm price changes produce minimal effect. Farms with sales less than $10,000 have an elasticity that is less than 0.5, while farms selling $10,000 to $19,999 worth of products have an elasticity near 1.0. That means that a 10-percent increase in prices received generates a

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[12] The purchasing power of the median family income is more than 30 percent greater than it was in 1960, while the nominal level is more than four times the 1960 level.

Table 11--Price changes needed to achieve income parity, by sales class

Year	Sales class (dollars)								
	500,000 and over	200,000 to 499,999	100,000 to 199,999 1/	40,000 to 99,999	20,000 to 39,999	10,000 to 19,999	5,000 to 9,999	2,500 to 4,999	0 to 2,499
					Percent				
1970	NA	NA	-27.7	-19.4	-11.2	2.1	22.9	70.8	169.5
1971	NA	NA	-25.7	-17.7	-9.3	4.2	24.8	71.2	172.0
1972	NA	NA	-28.6	-21.2	-12.6	.3	18.7	59.4	143.1
1973	NA	NA	-34.6	-25.2	-15.5	-3.8	8.9	32.4	58.2
1974	NA	NA	-32.5	-18.6	-9.0	2.3	11.1	24.0	15.2
1975	-33.0	-28.3	-22.5	-11.9	4.0	19.5	35.8	56.2	147.3
1976	-31.7	-25.1	-19.5	-8.7	7.2	20.5	36.5	62.4	151.6
1977	-29.6	-20.9	-15.4	-4.4	12.8	28.7	52.9	103.2	259.8
1978	-32.9	-23.1	-17.8	-6.9	10.5	24.0	44.1	93.7	220.3
1979	-31.1	-19.6	-13.2	-1.2	15.6	23.1	37.3	82.7	140.0
1980	-33.2	-17.1	-9.0	4.6	22.5	29.9	43.7	88.0	133.8
1981	-33.0	-13.7	-4.7	10.1	29.2	37.6	52.2	98.5	147.3
1982	-32.4	-13.9	-5.3	9.5	29.6	41.1	60.0	115.9	202.1
1983	-31.4	-15.5	-8.5	3.4	22.8	36.0	51.6	110.1	201.6

NA = Not available.

1/ In 1970-74: $100,000 and over.

Sources: Computed from table 10 and appendix table 2.

2.2-percent rise in total income for the under-$10,000 sales class, but a 9.5-percent rise in income for the $10,000 to $19,999 group. For farms selling more than $20,000, the elasticity of family income with respect to farm commodity prices is between 2.0 and 4.5. The elasticity for firms with more than $500,000 sales is less, because their off-farm income is almost twice as large as that in the $200,000 to $499,999 size class, and nearly one-third larger than the off-farm income of the smallest farms.

The preceding analysis drives home the difference between farm price policy and farm income policy. Goals of raising the incomes of farm families cannot be achieved by a policy of raising farm prices without distorting the income distribution within the farm sector. For many reasons, income parity for all farms cannot be achieved by applying a price parity standard for all commodities. First, farms with sales greater than $100,000 realize income far greater than the median U.S. family's. Second, all farms selling a commodity benefit from the price enhancement effects of price support programs. Third, the larger farms realize four to five times the proportionate gain in income compared with the moderate-sized farms whose economic conditions are used to justify the price support programs. The net income gains realized by larger farms are substantial. Last, with the parity ratio registering near 51 percent in late 1985, the near doubling of prices needed to restore 1910 commodity unit purchasing power to 1986 commodities would multiply some farmers' incomes more than fivefold.

Table 12--Effect of farm price increase on operator family income in 1983

Sales class (dollars)	Total family income (1983)	Added income generated by price increases of--			
		3.4 percent	22.8 percent	36.0 percent	51.6 percent
			Dollars		
500,000 and over	596,187	62,202	415,070	654,904	938,871
200,000 to 499,999	76,844	11,493	76,691	121,005	173,473
100,000 to 199,999	38,474	5,561	37,111	58,554	83,943
40,000 to 99,999	21,907	2,673	17,837	28,143	40,346
20,000 to 39,999	16,493	1,212	8,087	12,760	18,292
10,000 to 19,999	18,324	594	3,965	6,256	8,969
5,000 to 9,999	19,891	311	2,073	3,271	4,689
2,500 to 4,999	19,509	157	1,050	1,657	2,375
0 to 2,499	21,294	56	372	586	840

Source: Computed from appendix table 2.

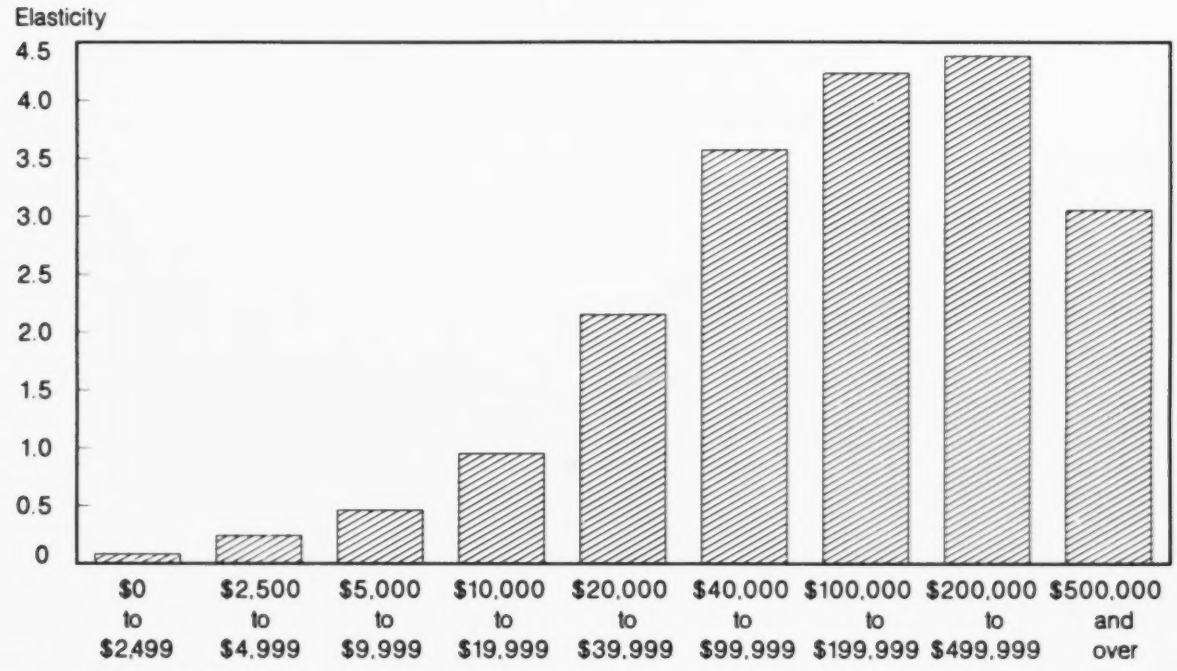
Although parity-level prices would give nearly every farm with sales greater than $2,500 an income at least as large as the median U.S. family, full parity would boost the farm family income in the $500,000-plus category to more than $2 million. Yet, farms selling less than $2,500 would still be more than $1,600 below the median family income. Even if parity prices could be achieved without cost, it is unlikely that American social policymakers would consciously choose those outcomes.

Yet, the very large price elasticity of farm family income is basic to a very real problem in farming, namely, risk. Small price decreases for farm commodities impart proportionally much larger income effects to the farmers producing the bulk of that product. On the other hand, similar magnitudes of price increase could nearly double the income of those farmers in the good years. This amplification of price variability into income and cash flow variability affects not only farm families but also farm lenders.

An appropriate role for farm price policy would be to moderate year-to-year price fluctuations whether or not the policy attempts to enhance market prices, counteract long-term trends, or restore archaic price levels.

Figure 5

Price Elasticity of Farm Family Income by Sales Class, 1983



Source: Computed from table 12.

ALTERNATIVE FORMULAS FOR PARITY PRICES

For as long as there have been parity prices there have been criticisms and proposed improvements. Since the parity price formula was last changed in 1956, many of the improvements to the formula recommended in a 1957 report to Congress are still valid today. We consider some new ones and highlight those set forth in the 1957 report (66).

Recently Recommended Improvements

Refining two technical aspects of the concepts underlying the parity price definitions would keep parity prices more responsive to the current situation. The first refinement would change the definition of the adjusted base period price by deflating the moving average of the commodity prices by the index of prices paid by farmers, rather than the prices received index. Under this new definition, the parity price would be consistent with a longrun average, adjusted for current input costs. The second refinement would change the interest and tax components of the parity index to reflect price changes alone, rather than the expenditures they now reflect. The tax component should be dropped if it cannot be broadened to include all taxes paid by farmers.

Redefine Adjusted Base Prices

The 1948 Agricultural Act replaced the actual 1910-14 commodity price average in the parity calculation with the concept of "adjusted base period price." The adjusted base price for a commodity is defined as its 10-year average price divided by the prices received index. The National Agricultural Statistics Service recommends an alternative definition: the average commodity price divided by the prices paid index.[13] Under this latter definition, the parity price becomes a consistent estimate of the longrun average price with an adjustment to reflect the difference between current input prices and the longrun average price of inputs.

The adjusted base period price is used in calculating parity prices for individual commodities. The parity price is the product of the adjusted base price and the current month's index of prices paid by farmers for commodities, interest, taxes, and wage rates (1910-14 base).

The parity price under the current definition is 1.926 times the 10-year moving average of the commodity price, while the parity price would be only 1.307 times the 10-year average price if the adjusted base price were defined in terms of the prices paid index. The new definition of adjusted base prices would reduce parity prices for all commodities approximately 32 percent (table 13).

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[13] Fred Thorp, chief, Prices and Labor Branch, National Agricultural Statistics Service, USDA, originated the alternative definition.

Table 13--Actual and adjusted base period prices for parity

Commodity	Unit	Actual 1910-14 average	Adjusted base price	
			Current definition1/	Alternative using PPFI2/
			Dollars	
Base period price increased by 1948 legislative adjustment:				
All milk sold to plants	Hundredweight	1.61	2.10	1.43
Wool	Pounds	.18	.22	.15
Beef cattle	Hundredweight	5.52	9.07	6.15
Calves	Do.	6.84	10.40	7.06
Hogs	Do.	7.29	7.65	5.19
Lambs	Do.	5.96	10.30	6.99
Dry edible beans	Do.	3.39	3.44	2.33
Sweet potatoes	Do.	1.61	2.22	1.51
Base period price reduced by 1948 legislative adjustment:				
All wheat	Bushels	.88	.61	.41
Rice	Hundredweight	1.81	1.74	1.18
Corn	Bushels	.65	.45	.30
Oats	Do.	.40	.26	.18
Barley	Do.	.62	.40	.27
All hay, baled	Tons	11.90	11.10	7.53
Cotton	Hundredweight	11.92	11.20	7.60
Peanuts	Do.	4.83	4.04	2.74
Potatoes	Do.	1.13	.87	.59
Flaxseed	Bushels	1.68	1.05	.71

1/ The 120-month (1976-85) average of the prices received by farmers index is 582.

2/ The 120-month (1976-85) average of the prices paid by farmers index (PPFI) is 858.

Source: (*78*).

Revising the definition of the adjusted base period price would link the parity price for individual commodities more directly with their recent price experience and remove the major problem with a fixed base period for parity prices: namely, the divergence between the prices received index and the prices paid index over time. That divergence has caused parity prices to drift away from the prices actually received by farmers. Under the proposed definition, parity prices would deviate from average prices by the ratio of current to average costs. Consequently, parity prices would stay more in line with commodity prices regardless of the base period chosen for parity.

"Adjusted base period prices" replaced "fixed base prices" in parity legislation partly because the adjustment process permitted parity prices to reflect current price relationships among farm commodities. In that way, parity prices were no longer fixed in relation to one another based on 1910-14 relationships, but were allowed to vary with current market conditions. That flexibility depends solely on the use of an annually updated, moving-average commodity price in the numerator of the adjusted base price, not the index used to deflate that average back to its "1910-14 purchasing power." Substituting the prices paid index for prices received in the legislative definition would retain the flexibility of relative levels of parity prices and also keep the absolute levels of parity prices in line with current market prices.

Modernizing Adjusted Base Prices:
A Case Study

Take the case of milk. In January 1986, its parity price was $23.50. With the prices paid index at 1,121 percent of base, the adjusted base price for milk was about $2.10. The adjusted base price is the ratio of the $12.22 average price for milk received during the period January 1976 to December 1985 to the index of prices received for all farm commodities, which averaged 582 percent over that period. That $2.10 adjusted base price compares with the actual average price received for milk in the 1910-14 period, which was $1.61 per hundredweight (table 13). The adjusted base period price for milk is about 30 percent greater than the price actually received in the base period. Under the proposed new definition, the adjusted base price is the quotient of the $12.22 average price and the 858 index point average of the index of prices paid. The new adjusted base price for milk would be $1.43, or about 11 percent less than the average price received in 1910-14. The parity price for milk under the new definition of adjusted base prices would be $16.03 per hundredweight.

Redefine Interest and Tax Components

The parity index contains subindexes for interest payments per acre of farmland and payments of real estate taxes per acre of farmland, as specified in legislation enacted in 1935.[14] Both of these concepts reflect expenditures entailing price and quantity dimensions. Since the parity index is the index of prices paid by farmers, these components should be redefined so as to reflect only the price dimension. The interest component would then reflect only the interest rate on farm debt. Similarly, the price component of the real estate tax is the assessment rate per dollar of value. Moreover, the tax component should either be expanded to include all tax payments (income, sales, excise, estate, personal property, and so forth) or be eliminated entirely, since the real estate taxes are unrelated to production. Both the interest change and the tax change would reduce the overall parity price index.

The interest index reflects the interest paid on debt secured by farm real estate per acre of farmland. In 1974, the index was 1,103: 11 times the base period level. In 1984, the index stood at 4,251 percent of the level in 1910-14: 42 1/2 times the base period level.[15] Certainly, 1984 interest rates were higher than in 1974, and even higher than in 1910-14, but that alone does not explain the magnitude of increase.[16] Since 1974, the portion of land that is mortgaged is higher, the price of land is higher, and a greater fraction of the original price of the land is being financed. Each of these factors multiplies the effects of the others, distorting the price picture when viewed through the parity index.

If the interest component of the prices paid index were purely an index of interest rates, with weights periodically revised to reflect the greater expenditure on interest, the result would substantially reduce the overall parity index. In 1974, total interest expense constituted 8 percent of production expenses, and by 1983 it was 15.7 percent, nearly twice the share. By doubling the weight given to an index component whose value is much smaller than the rest of the components, the parity index would be considerably reduced.

Because the tax component of the price index does not include all taxes paid by farmers, and because the link between the taxes paid and the contributions of public services to farm production is circuitous at best, its removal from the index of prices paid by farmers could be justified (*18*). Since the tax component exceeds the overall index, removing it from the computation would reduce the level of the parity index.

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[14] The 1948 redefinition of the parity index seems to call for an index of interest rates, rather than interest payments per acre. Yet, the computations continue in the form of the 1935 definition.

[15] By comparison, the subindex of items used for production with 1910-14 base stood at 896 in 1984 while the general parity index was 1,127. The tax and wage rate subindexes were 2,123 and 2,868 in 1984.

[16] The average interest rate on farm mortgages outstanding in 1919 was 6.1 percent, which compares with 6.6 percent in 1974, 9.9 percent in 1983, and 9.8 percent in 1984. In 1910-14 terms, such an index of interest rates might have been about 108 in 1974 and 162 in 1983.

An alternative to eliminating the tax component would be to use an index of the ad valorem tax rates on all agricultural property rather than the real estate tax payments per acre. Data reported in Farm Real Estate Taxes indicates very little increase over time in the rate of taxes paid per dollar of value (76). Consequently, this change would effectively reduce the numerical value of the parity index.

Improvements Recommended in 1957

The 1957 USDA report set forth four parity price alternatives: moving to different base periods, devising separate parity indexes for individual commodities, adjusting the prices to reflect gains in production efficiencies, and reflecting the costs of the price stabilization programs in the parity prices. The report also discussed parity income formulas, based on historical income ratios and on direct comparisons of farm and nonfarm incomes.

Select New Base Periods

From its start, the parity price system was anchored to the 1910-14 base period. Even the 1948 revision, which shifted from a fixed base to an adjusted based price for individual commodities, based the overall average level of parity prices on the prices paid by farmers in that pre-World War I base period. If the parity index is to be meaningful, it should reflect the current character of inputs bought and the prices paid by the farms which produce the greatest output. Because today's technology and input mix is far different from what it was in 1910, the current base period is outmoded.

Selection Considerations. The ideal base period for any index would have a number of characteristics. First, the structure of agriculture in the base period would resemble the agriculture that is likely to prevail for a number of years. Otherwise the parity measurement would have little meaning in appraising the agricultural situation as it unfolds.

Second, an ideal base period would reflect as stable a price situation as possible, particularly one unaffected by wars and depressions, which are two chief causes of sudden changes in price relationships. It would also be long enough to smooth out any shortrun cyclical relationships between farm and nonfarm prices, and among farm product prices.

Third, the base period would permit as accurate a measurement of change as is possible in view of the importance with which the parity index and the index of prices received have been politically endowed. This factor argues for a relatively recent interval as well as one that is not too long. Data availability is also an important factor in the choice.

Fourth, a major consideration is the consistency of this base period with those of other indexes produced by the Federal statistical agencies. The deflators for the national income and product accounts are based on the year 1982. Most other indexes, particularly those reported by the U.S. Department of Labor's Bureau of Labor Statistics (BLS) and the U.S. Department of Agriculture, are currently based on the year 1977. The consumer price index still uses the 1967 base period, although its component weights are 1982-84 levels. The base

periods for all of these major economic indicators are periodically revised, usually at 10-year intervals.

Alternative Intervals. The 1957 USDA report examined a number of alternative time intervals as base periods for computing parity. It recommended using 1947-56 as the new base period for the parity indexes and employing a 10-year moving average for individual commodity prices. Weights for individual items in the indexes would, presumably, also be based on these 10-year moving averages.

More recent time intervals would need to be evaluated in view of these considerations. Pre-1973 periods would be ruled out by the need to represent the current and future organization of agriculture.

The need to represent a stable relative price situation suggests 1973-77 or 1979-83, based on the standard deviation and average of the parity ratio in those intervals.[17] Output price varied less in 1973-77 and 1979-83 than in 1975-79 or 1980-84. The periods 1975-79 or 1980-84 represent relatively stable input price situations.

The post-1973 periods well satisfy the accuracy of measurement consideration. The Farm Costs and Returns Survey and other gauges of farm production expenditures and commodity production costs were all conducted since that time. The Census of Agriculture (*80*) added the capabilities of tracking individual farms across time and matching capital information from the Farm Finance Survey (*81*) with the production responses in the corresponding census, both of which enhance the accuracy of the statistical representation of farm operations.

If the base period for parity were 1975-79, with both the prices paid and prices received index averaging 100 percent in that interval, the effect would be to lower parity prices by 29.2 percent. With 1980-84 as a base for the parity comparison, parity prices would stand 40 percent below their levels under the 1910-14 standard.

Devise Separate Parity Indexes for Individual Commodities

The current parity index is a broad measure of the changes in the prices paid by farmers for the commodities and services used in producing all farm commodities as well as in family living. It represents all farmers, and its weighting system reflects the average purchase pattern of operators producing a wide variety of commodities under a wide variety of conditions. The assumption implicit in the index is that each farmer purchases every item in the index in the same proportion when, in fact, farmer expenditure patterns vary by the commodities produced and by region.

Devising separate parity indexes for individual commodities would be one way to accommodate those differences. Separate indexes would give due weight to the differences in the kinds and quantities of items associated with producing individual farm commodities or groups of commodities. In that way, the purchasing

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[17] See Appendix table 3 for a full description.

power of an individual farm product would be determined from specific cost factors associated with it rather than from the generalized index now used.

The 1957 report presented indexes of prices paid for production input commodities on 27 types of farms in various regions of the country.[18] For example, separate prices paid indexes were presented for dairy farms in the Central Northeast, eastern Wisconsin, and western Wisconsin; for Corn Belt farms characterized as hog-dairy, hog-beef raising, hog-beef fattening, and cash grain farms; and for cotton farms in the Southern Piedmont, in the Texas black prairie, in the Texas high plains with and without irrigation, and in both small- and large-scale farms in the Delta. The indexes were based on the USDA cost and returns budgets which have not been updated since 1969 (*19, 20, 71*).

A comparison of the prices paid by farm type in 1955 with the 1947-49 base showed highly diverse results. Among different types of farms, the increases ranged from 1 percent for irrigated-cotton farms in the Texas high plains to 23 percent for cash grain farms in the Corn Belt. The U.S. average index of prices paid by all farms showed a 12-percent increase, which was also the midpoint of the range for the farms shown. Nearly as much variation was evident in the prices paid by farmers producing a given commodity in different regions of the country as among all commodities and all regions.

A single index on which support prices are based would treat the farmers who irrigated cotton more favorably than the cash grain farmers. The separate parity indexes were intended to remedy this inequity. Such commodity-specific indexes are not far removed from estimates of the costs of production for individual commodities.

The 1957 report considered developing a separate parity index for each commodity to be a major undertaking, in view of the 160 farm products for which parity prices were calculated at that time, and did not recommend doing so.

A more modest proposal would be to compute indexes for the four prototype processes that characterize agricultural production: perennial crop production, annual crop production, animal reproduction, and animal growth and nutrition. Perennial crop production includes the orchard fruits, sugarcane, some vegetables such as asparagus, and some hay and pasture crops such as alfalfa. Annual crops, which are harvested within one growing season, constitute the largest part of crop agriculture. Animal reproduction processes include calf and feeder pig production, egg laying, and hatchery operations. Animal growth and nutrition processes predominate in broiler production, feedlot and growout operations, and in milk production. Different technologies and different kinds of inputs are required for each of these processes. Although individual commodity indexes tend to freeze technology and preclude product substitution, using broad categories lessens that objection.

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[18] The indexes were constructed on a whole farm-family basis rather than as commodity-specific budgets. Allocating certain costs, particularly overhead and family living, to a specific commodity and aggregating over different types of farm producing a commodity required some limiting assumptions.

Build an Efficiency Modifier Into Parity Prices

Contemporary agriculture uses resources more efficiently than when parity was conceived. Output today, for example, exceeds that of agriculture during the base period for parity. Substantially less labor and fewer firms are needed now than in earlier years, yet the total economic input into agriculture is not much greater than what it was historically.

The economic gains derived from improved efficiency can be distributed in a number of ways: through increased returns to capital investment, higher wages for labor, improved quality of products, lower prices, or through any combination of these means. The competitive nature of agriculture translated many of its efficiency gains into lower product prices. However, in the nonfarm sector, price cuts attributable to higher productivity or increased efficiency are less evident.

Contemporary U.S. agriculture, with its sophisticated machines and small labor force, has made tremendous efficiency gains that could be incorporated into the parity price formula.

If the parity index were adjusted to reflect agriculture's efficiency gains, the result would reflect the purchasing power of agricultural resources rather than that of a unit of the output produced by those resources. The 1957 parity report discussed how such an efficiency modifier could be developed and whether it should logically be introduced into the parity price formula (66).

When the report was published in 1957, preliminary indexes were available which reflected the trends in the use of productive inputs and of input per unit of output in the agricultural sector.[19] At that time, however, there was no comparable index of multifactor productivity for the nonfarm economy.[20] Measures of labor productivity, which are less reliable than the multifactor measures, were available for both the farm and nonfarm business economy and were used in the 1957 analysis.

The 1957 report proposed three alternatives for dealing with efficiency gains in agriculture: (a) fully reflect the efficiency gains by reducing parity prices in proportion to the productivity gains in agriculture, (b) partially reflect the efficiency gains by reducing parity prices proportionate to the extent that agricultural productivity gains exceeded gains in the nonfarm economy, or (c) continue to use the parity formula with no modification to reflect changing productivity.

Because the base period for the productivity indexes has an important effect on a transformed parity index, the base periods for the productivity and price indexes ideally should be identical. In principle, then, the productivity indexes should be expressed on a 1910-14 base period in the parity comparison. In practice, however, lack of available data prevents use of a 1910-14 productivity base period: the USDA index could be transformed into a 1910-14 base but the BLS index could have no base prior to 1948.

To show the effect of a productivity modifier on parity prices, both farm and nonfarm productivity indexes were transformed into a base of 100 percent in 1950, when farm prices approximated 1910-14 parity levels (table 14).[21] In 1950, the farm productivity index equaled 142.6 percent of its average during the 1910-14 period.

In all but 1 year since 1948, the farm productivity index (1950 base) exceeded the nonfarm productivity index. In 1980, it stood at 115 percent of the nonfarm index. On that basis, parity prices adjusted for productivity gains would be below unadjusted parity prices. Taking 1950 prices to be at parity levels,

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[19] The indexes were subsequently published by Loomis and Barton (*41*), and continue to be updated annually in the Production and Efficiency issue of the Economic Indicators of the Farm Sector (*75*).

[20] The Bureau of Labor Statistics did not introduce measures of multifactor productivity until 1983, when it published a series with historical data reaching back to 1948 (*83, 84*).

[21] The published multifactor productivity indexes with 1977 as base period are tabulated in the Appendix. See appendix table 4.

Table 14--Multifactor productivity comparison: U.S. farm and nonfarm economy, 1948-84

Year	U.S. farm output per unit of input	Private nonfarm business sector multifactor productivity	Ratio of farm to nonfarm productivity
		Percent of 1950	
1948	103	95	109
1949	100	94	106
1950	100	100	100
1951	100	102	98
1952	103	103	100
1953	105	105	100
1954	107	104	102
1955	110	109	101
1956	111	109	103
1957	113	109	104
1958	121	109	111
1959	121	114	107
1960	126	114	111
1961	128	116	111
1962	130	120	108
1963	134	123	109
1964	133	127	104
1965	141	131	108
1966	136	133	102
1967	141	133	106
1968	143	136	105
1969	144	135	107
1970	143	133	107
1971	154	135	114
1972	154	140	110
1973	156	144	108
1974	148	138	107
1975	162	137	118
1976	161	143	113
1977	164	147	112
1978	167	148	113
1979	172	146	118
1980	164	143	115
1981	190	143	133
1982	192	141	136
1983	164	146	112
1984	190	151	126

Source: Computed from appendix table 4.

which was approximately the case, the adjusted parity prices under alternative (a) would be 61 percent of the unadjusted parity prices in 1980. Under alternative (b), the adjusted parity prices in 1980 would be 87 percent of the unadjusted parity prices.

The alternative productivity adjustments have an interpretation as terms of trade concepts in the international economics literature.[22] The unadjusted parity index (c) measures the net barter (or commodity) terms of trade between the agricultural sector and the rest of the U.S. economy. Reducing the parity index by the full productivity gains in agriculture, alternative (a), results in a single factorial terms of trade index. Reflecting productivity gains in both the agricultural and nonagricultural sectors of the economy, as under alternative (b), would transform the index into a double factorial terms of trade index. In addition, the international trade literature refers to "income terms of trade," which is like the ratio of the parity index to the index of total agricultural output. Each of these "terms of trade" concepts ignores international transactions between either sector of the U.S. economy and the rest of the world.

Table 15 shows the international terms of trade representations of agricultural parity, together with the index of prices received by farmers. The four terms of trade measures represent alternative ways of incorporating productivity and output change into the parity index. All are expressed as a percentage of a 1977 base, but other base periods would yield similar results. By comparing the traditional parity price index (the commodity terms of trade) with the prices received index, we see that farmers received more than 1977-base parity prices in every year between 1948 and 1979. The single factorial and income terms of trade measures show a different pattern: only the prices received in 1948 and between 1972 and 1981 were higher than the 1977 terms of trade. The double factorial terms of trade, which includes the relative change in farm versus nonfarm multifactor productivity, shows that prices received were higher than the 1977 terms of trade in every year before 1982.

The separate terms of trade representations of the parity index each present a slightly different picture of the agricultural price situation relative to the 1977 base year. The commodity terms of trade, which is the same concept as the current parity index (except on a 1977 base), shows that the prices that farmers received in 1984 were 87 percent of their 1977 relationship to prices paid. The income terms of trade, which is the current parity concept divided by the index of total farm output, shows that prices received in 1984 were 96 percent of their 1977 relationship to prices paid. The single factorial terms of trade, which is the current parity concept divided by the farm sector multifactor productivity index, shows that 1984 prices received were 100.4 percent of the 1977 relationship to input prices. Under the double factorial terms of trade, which is the current concept divided by the ratio of the farm/nonfarm multifactor productivity indexes, prices received in 1984 were 98 percent of their 1977 relationship to prices paid.

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[22] See for example, *7, 11, 30, 31, 35.*

Table 15--Agricultural parity: International terms of trade alternatives

Year	Commodity (net barter) terms of trade[1/]	Income terms of trade[2/]	Single factorial terms of trade[3/]	Double factorial terms of trade[4/]	Index of prices received by farmers
			Percent of 1977		
1948	38	60	60	39	63
1949	36	58	59	38	55
1950	37	61	61	41	56
1951	41	65	67	47	66
1952	42	64	67	47	63
1953	40	61	63	45	56
1954	40	61	62	44	54
1955	40	58	60	44	51
1956	40	58	59	44	50
1957	42	63	61	45	51
1958	43	59	58	43	55
1959	43	58	58	45	53
1960	44	58	57	44	52
1961	44	58	56	45	53
1962	45	58	57	47	53
1963	45	56	55	46	53
1964	45	57	56	48	52
1965	47	57	55	49	54
1966	49	62	59	54	58
1967	49	59	57	52	55
1968	51	60	59	54	56
1969	53	62	60	55	59
1970	55	65	63	57	60
1971	58	63	62	57	62
1972	62	68	66	63	69
1973	71	76	75	73	98
1974	81	92	90	85	105
1975	89	94	90	84	101
1976	95	98	97	94	102
1977	100	100	100	100	100
1978	108	104	106	107	115
1979	123	111	117	116	132
1980	138	134	138	134	134
1981	150	127	129	126	139
1982	157	135	134	129	133
1983	160	168	160	159	134
1984	164	148	141	145	142

1/ The existing index of prices paid by farmers (1977 = 100).
2/ Prices paid index divided by the index of total farm output.
3/ Prices paid index divided by the multifactor farm productivity index.
4/ Prices paid index divided by the ratio of the farm to nonfarm multifactor productivity indexes.

The terms of trade measures represent four different approaches to incorporating productivity and output change into the parity index. The economics literature recommends the double factorial terms of trade as the more appropriate measure, but has proven more theorems about the sources of change in the commodity terms of trade. The single factorial and income terms of trade correlate more directly with the actual prices received by farmers than the other two measures.

These comparisons show that a "parity" type of index which accounts for no change in farm output or productivity paints a less favorable picture of the farm price situation than do any of the indexes reflecting production or efficiency gains.

Adopt a Program Cost Modifier for Parity Prices

Government commodity price support programs, income support programs, and export subsidies, have, for many years and at substantial cost, maintained prices for some products higher than market forces would have allowed. Parity prices for supported commodities reflect this price enhancement, while parity prices for unsupported ones are forced to absorb downward adjustments. As a matter of equity, and to eliminate the feedback from program costs to parity prices which may in turn increase future program costs, policymakers have suggested removing the influence of government programs from the parity calculations.

A 1956 regulation which is still in effect makes allowance for unredeemed loans and specific supplemental payments in calculating the adjusted base prices for parity (45). Many other program cost factors that could have been used to adjust parity prices were excluded from that regulation.

The 1957 report acknowledged that measuring and removing all the influences of Federal Government programs on the farm price structure was not a simple matter. It did, however, advocate assessing the tangible Government losses, incurred or prospective, which could be allocated to specific commodities. The report targeted specifically: the realized losses on Commodity Credit Corporation (CCC) price support operations, the costs of CCC commodity export programs, International Wheat Agreement costs, costs of Section 32 surplus removal operations, and certain costs associated with foreign currency sales under P.L. 480 (Food for Peace program). The acreage reserve program, according to the report, would also affect future program costs.

To estimate what those program costs targeted by the 1957 report amounted to in recent years, we examined CCC outlays to the farm sector for 1975-84. We allocated direct Government payments in the form of deficiency payments, diversion payments, disaster payments, reserve storage payments, and dairy purchase costs to the respective commodities. The payments affected wheat, rice, cotton, feedgrains, and dairy products. Recoverable costs from CCC loan operations were assumed to balance out over time and were not allocated to the commodities. Neither the benefits of marketing orders for fruits, vegetables, and other commodities, nor the effects of other programs were examined. The nearly $10 billion worth of payment-in-kind (PIK) commodities which were distributed in 1983 and 1984 were excluded from the subsidy calculation because the data source did not identify them by separate commodities (table 16).

We also estimated the subsidy per unit of output, which is substantial (table 17).[23] Even without the PIK distribution, wheat and rice producers received direct payments equal to nearly one-fourth the value of their output in 1984.

Table 16--Selected commodities: Total Government outlays for calendar years 1975-84[1/]

Year	Direct Government payments [2/]				Dairy purchase costs
	Wheat	Rice	Feedgrains	Cotton	
	Million dollars				
1975	77.0	0	279.0	138.0	306.0
1976	135.0	1.0	196.0	108.0	313.0
1977 [3/]	887.0	130.0	187.0	89.0	681.0
1978 [4/]	963.0	3.0	1,172.0	127.0	296.0
1979	173.1	58.7	655.1	185.0	1,008.0
1980	235.3	1.9	504.9	171.7	1,519.1
1981	750.2	1.7	385.7	222.0	2,182.0
1982	925.9	155.9	1,347.4	800.3	2,562.3
1983 [5/]	1,130.4	277.6	1,587.0	662.2	2,611.4
1984 [6/]	1,997.2	191.8	497.6	274.7	2,057.4 [7/]

1/ These approximations are not official Commodity Credit Corporation budget outlays.
2/ Includes deficiency, diversion, disaster, and reserve storage payments.
3/ $15 million reserve storage payments were not allocated to wheat and feedgrains in 1977.
4/ $320 million reserve storage payments were not allocated to wheat and feedgrains in 1978.
5/ Excludes $5,241.5 million payment in kind (PIK) commodities distributed in 1983.
6/ Excludes $4,474.1 million PIK commodities distributed in 1984.
7/ Includes $536.1 million milk diversion payment in 1984.

Source: (73).

[23] The subsidy per unit of output was estimated by dividing the outlays in each calendar year by the production which occurred in the previous calendar year. (In fact, CCC payments within a given calendar year may pertain to several different crops.) The percentage subsidy was estimated by dividing the payment per unit of output by the average price received for the commodity in the calendar year the payment was made.

The cotton subsidy ranged up to one-fifth the value of output, while the dairy subsidy approached one-seventh of its output value.

Subsidy effects can be removed from parity prices in several ways. If the parity price for an individual commodity were multiplied by 1 minus the percentage subsidy for that commodity, much of the feedback from parity price to program cost could be eliminated. The greatest effect could be achieved by subtracting the maximum percentage subsidy over the most recent, say, 10-year interval from the parity price. A much smaller effect would be achieved by subtracting the percentage subsidy from each year's price when the "adjusted base period price" for the commodity parity price is calculated.

Table 17--Selected commodities: Government outlays per unit[1/] and percentage subsidy[2/] for calendar years 1975-84

Year	Direct Government payments								Dairy purchase costs (hundredweight)	
	Wheat (bushels)		Rice (hundredweight)		Feedgrains (bushels)		Cotton (pounds)			
	Dol.	Pct.	Dol.	Pct.	Dol.	Pct.	Dol.	Pct.	Dol.	Pct.
1975	0.043	1.2	0	0	0.045	1.7	0.025	6.0	0.265	3.0
1976	.063	2.0	0.008	0.1	.026	1.0	.027	4.5	.271	2.8
1977	.413	18.0	1.125	11.9	.024	1.2	.018	2.9	.567	5.8
1978	.471	16.7	.030	.4	.138	6.6	.018	3.3	.241	2.3
1979	.097	2.8	.441	4.2	.072	3.1	.035	6.1	.830	6.9
1980	.110	2.9	.014	.1	.052	1.9	.024	3.5	1.231	9.4
1981	.315	8.1	.012	.1	.048	1.6	.042	6.2	1.698	12.3
1982	.332	9.4	.853	10.5	.135	5.7	.107	19.2	1.926	14.2
1983	.409	11.4	1.807	20.6	.156	5.2	.115	18.3	1.923	14.1
1984	.825	24.6	1.924	23.7	.088	2.9	.074	11.2	1.470	11.0

1/ Per unit of previous year's crop.
2/ Percent of calendar year average price.

Source: Computed from table 16 and appendix tables 5 and 6.

ALTERNATIVE STANDARDS OF PARITY

Alternative performance measures could be used as the bases for setting support prices in place of changing the parity price definition. Three such standards will be explored as means of moving away from price-enhancing support levels. The premises underlying this discussion are that farm income policy can be separated from price policy and that price policy can serve different ends than in the past.

Price supports in the past have maintained the prices of farm commodities above those in a free market. As a result, commercial sales in both domestic and export markets have been restricted, the income distribution within agriculture has become more inequitable, the Federal budget is exposed to potentially large outlays, and smaller farmers are provided only minimal income support. Price-enhancing support levels can be based on any performance standard. However, consumers and taxpayers could realize economic and social benefits if the supports were set below market price. In the heterogeneous agriculture of the United States, some firms continue to produce commodities profitably in spite of lower prices, while others go out of business. Competitive efficiencies can be gained by recognizing that fact and letting prices fall, facilitating the adjustment process. By doing so, farm price policy can be separated from agricultural income policy, and their separate effects analyzed.

The standards described here provide a framework for that analysis. The marginal social cost of production is a safety net which would not enhance prices. On the other hand, the producer's costs of production would likely lead to price-enhancing support levels. The income needs of smaller farmers can be addressed by targeted direct payments based on an income parity standard.

Cost of Production

Cost of production has vied with parity as a basis for setting farm prices since the 1920's. In the world of commerce, reason would dictate that a product should sell for at least its production cost, for if it didn't why is it produced? Cost, in the economist's timeless and competitive long run, adjusts to exactly what the product sells for. But in commercial agriculture, cost is not a fixed constant. The per-bushel cost of producing a 4-billion bushel corn crop is less than the per-bushel cost of producing 8 billion bushels under the same climatic conditions.

Although cost of production might be an agreeable pricing standard, how it would be implemented is subject to considerable debate (*24, 49*). Debate arises from the fact that commodities and resources have different values or costs when viewed from different perspectives (the private cost to individuals differs from the value to society at large). Fixed assets have distinct acquisition costs, values in use, and salvage values (*15, 29, 36, 37*).[24] Land, specialized

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[24] When a resource is fixed, its salvage value in nonagricultural use is less than its value in agricultural use, which is less than the cost to acquire additional units to augment or replace the stock in agriculture.

machinery, livestock and, often, operator and family labor are all assets fixed within the agricultural sector.

Debate also stems from the difficulty of accurately estimating various costs. Unpriced inputs and the costs of capital and overhead, for instance, pose difficult problems for those seeking to estimate the total costs of a commodity rather than its assignable variable costs. When market prices rather than shadow costs are used to evaluate nonpurchased resources, the inferred unit cost of production might exceed the expected selling price (63).

Many ideas on implementing a cost of production pricing standard have been proposed. During the 1970's, analysts revived the suggestion that cost of production replace parity as a basis for setting price supports. They recommended using the U.S. average cost of production, but recognized the possibilities of a land price spiral if the total land charge were included in the cost estimate. Another approach suggested using a fixed markup over the U.S. average variable costs of production as the basis for setting price support levels. The proposed markup was a fraction of the difference between the price and average variable cost, averaged over a recent period of years.[25]

By focusing on the national average, these proposals afford protection to the average producer, or the producer of the average unit of output, but give no indication as to where marginal adjustments would occur. Implicitly, they make no allowance for diversity among producers whether by size of operation, regional location, or other trait.

An inherent difficulty associated with using the national average cost as an indicator is that, by definition, about half of the producers have costs in excess of that level. Another difficulty occurs when the support level guarantees some return to nonpurchased factors of production which becomes capitalized into the price or opportunity cost of the resource, leading to the land price spiral mentioned above. These difficulties are the result of examining the national average of the total costs per unit from a private producer's perspective, and are not present when the marginal cost of the last unit of output is examined from a social perspective.

Marginal Social Cost of Production

The marginal social cost of a commodity offers an alternative to parity as a base for price supports. A commodity-specific concept, the marginal social cost is defined by the opportunities foregone by society to obtain the last unit of its output. Operationally, it is equivalent to the average variable cost per unit on the highest cost farms, excluding the costs of landownership, capital,

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[25] In 1981, farm legislation established a National Cost of Production Standards Review Board as a forum to discuss USDA production cost estimates. This forum articulates what Black termed "normative costs," by recommending imputations which assure a given income to the farmer or resource owner (6).

and operator labor.[26] Under this standard, the geographic and technological diversity of production would provide rewards in proportion to size and efficiency for all but the farmers with the highest costs. The intent is to eliminate artificial incentives for the highest cost farmers and promote the most efficient change within the sector (52). In this way, the marginal social cost standard can address the problem of farmer risk without raising commodity prices.

While parity prices express a value society places on the commodities themselves, the marginal social cost expresses a value society places on the resources used to produce them. The variable expenses per acre, or per unit of livestock, are usually easy to determine. They are identified with the inputs used to raise a particular commodity and are purchased by virtually all producers of that commodity. The market prices of these inputs can be tracked, and, with the possible exception of pesticides, the market prices typically reflect society's value as well.

The social value of the assets fixed in agriculture is another matter. Since the nation is no longer expanding geographically, and since Federal farm policy has attempted to remove cropland from agricultural production for most of this century, the social value of added agricultural cropland is nearly zero. The nonagricultural use value of a milk cov is as input into a hamburger. The value of a grain combine in nonagricultural uses is small. The social value of a farm operator's time is what the operator would earn in a nonagricultural job.

Moreover, fixed assets are part of the business overhead and their costs are not able to be easily allocated to a particular production activity or commodity. Fixed asset costs are recovered from the gross margin between selling price and the variable costs of production for each of the commodities raised by the firm, plus whatever capital gains or losses are actually realized when asset ownership changes. Since no contract guarantees these fixed assets a specific rate of return, any imputation of farm overhead to specific commodity enterprises is equivocal.

Economic efficiency criteria argue that the marginal cost is a more appropriate basis for making price-setting decisions than is the average cost of production. That is, the cost of obtaining the last unit of output is more appropriate than the average cost of producing the total output. For a profit-maximizing firm in a competitive industry, the marginal cost is equal to its expected selling price

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[26] In this report, we use the cost averages by region, rather than the costs on individual farms, to estimate marginal social cost (72). Individual farm-based estimates require a special tabulation from the Farm Cost and Returns Survey (79). The regional average cost is less than the unit cost of the highest cost respondent in that region. The expected value of this highest unit cost is the product's anticipated selling price.

of the product. In a competitive industry, the marginal firm (the one most likely to enter or exit) is the one whose marginal cost equals the average variable cost of producing its current level of output. Therefore, an estimate of the marginal cost of a particular commodity is the average variable cost associated with the firm with the highest observed cost.[27]

Without accessing individual survey responses in the Farm Cost and Returns Survey, the unbiased estimate cannot be obtained (79). However, an indication of its magnitude can be obtained from regional averages of the variable cost per unit published in the USDA farm sector cost of production indicators (72). These regional averages are, obviously, lower than the costs of the highest cost firms. To estimate the average variable cost per unit of output, the variable costs per acre, or per cow (excluding costs associated with ownership of land, machinery, and breeding livestock and with operator and family labor) are divided by the production per acre or cow in that year. Appendix tables 7-12 compare the average variable costs of producing milk, corn, soybeans, winter and spring wheat, and cotton by region with the U.S. average.

Key price concepts for these commodities are summarized in table 18.[28] The marginal social cost for major program commodities is arrayed with the season average price received for the commodity, the parity price at the beginning of the marketing year, and the target price and loan rate for the commodity.

In the cases of wheat, corn, and milk, and to a lesser extent cotton, the loan rate (and the support price for milk) have provided a floor prices received. During 1982-84, the prices received for these commodities have hovered near the loan rate under the pressure of large supplies. The loan rate for soybeans has been low enough so as to not affect the market-clearing price.

The target price, where applicable, is the basis for a direct income support payment to producers. Participating farmers receive a direct payment equal to the difference between the target price and the loan rate (or an early season price received if that exceeds the loan rate).

For most of the commodities, the parity price is about two times the season average price or loan rate. The parity price for milk is about half again as large as the support or market price. By contrast, the parity price is nearly two times the marginal social cost of milk and three times the marginal social cost of other commodities. The variations across the five commodities in the

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[27] Estimation of the marginal cost is the statistical problem of determining the upper bound of a finite interval. When a sample of size n is drawn from a population uniformly distributed over the entire interval, the unbiased estimate of the upper bound based on the largest and smallest sample observations is: (n * largest - smallest)/(n-1) . For a complete explanation, see (40).

[28] The average variable and marginal social costs tabulated here were calculated using the realized yield per acre or cow. Consequently, weather-related events introduce more variability into these estimates than might be desirable. A moving average of yields would have substantially reduced the year-to-year variablity in the estimates.

farm price, marginal social cost, and support prices are shown as a percent of parity (fig. 6).

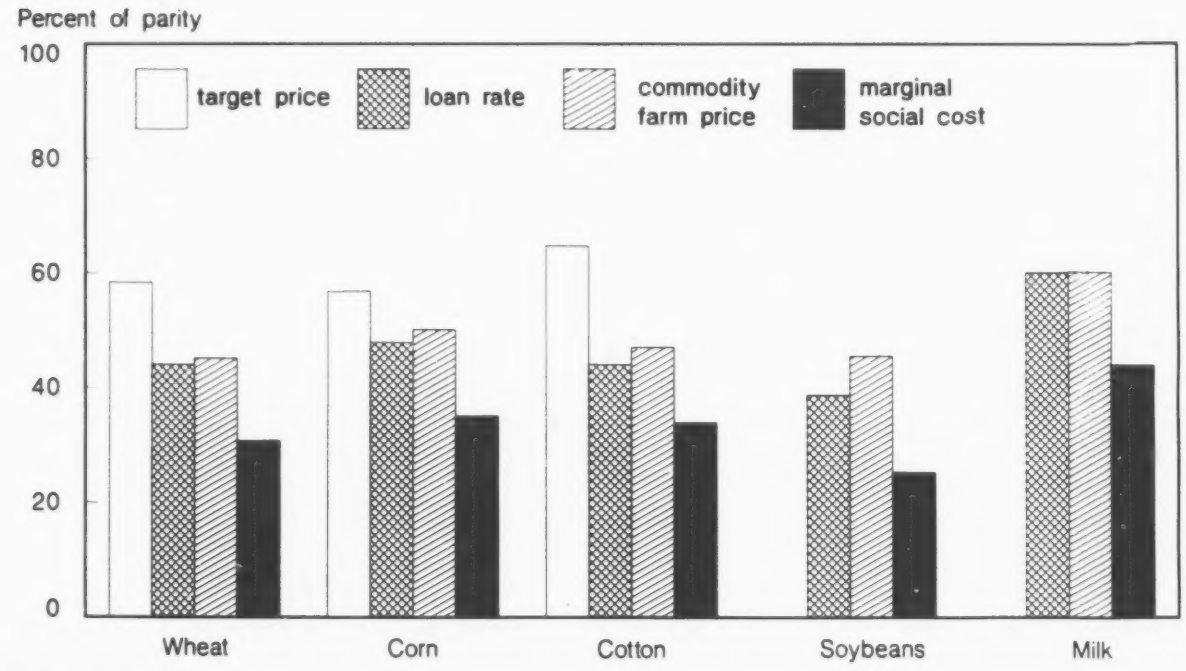
The difference between the marginal social cost and the price received plus any Government payments for the commodity compensates operators for their labor and ownership costs. The geographic differences in prices and cost levels provide an appropriate reward for the higher quality of the resources employed, or greater efficiency with which they are used. Producers with low variable costs, such as those in the Midwest, can afford to bid more for land and other capital resources because they have greater margins from which to pay. However, they must be careful not to pay more for the resource than it returns so they are not squeezed when asset values and commodity prices stop rising.

The marginal social cost concept offers a number of advantages. It includes the prices of inputs purchased by virtually all producers of the commodity. The prices are weighted by the actual input quantities used per acre of product. Technological progress, which systematically increases yields, consequently reduces the marginal social cost per unit of output. The concept recognizes the inherent diversity of U.S. agriculture, both among regions and among individuals within a region. As production practices change, the index weights can be updated from the Farm Cost and Returns Survey.

Its primary drawback is the number of commodities to which it would be applied. As many as 160 commodities have had parity prices, and currently about 60 commodity parity prices are calculated monthly. Each would have to be surveyed to determine production costs. The Farm Cost and Returns Survey (which estimates farm production expenditures) focuses only on major agricultural commodities, so many fruit and vegetable commodities which have parity prices would have to be added to the production cost survey.

Figure 6

Agricultural Price Concepts, 1984



Source: Table 20

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Table 18--Commodity price concepts, 1982-84

Commodity	Season average	Loan rate	Target price	Parity price	Marginal social cost
			Dollars		
Wheat, per bushel:					
1982	3.55	3.55	4.05	7.30	2.51
1983	3.53	3.65	4.30	7.41	2.56
1984	3.38	3.30	4.38	7.50	2.30
Corn, per bushel:					
1982	2.68	2.55	2.70	5.06	1.61
1983	3.25	2.65	2.86	5.17	2.35
1984	2.67	2.55	3.03	5.33	1.86
Cotton, per pound:					
1982	.594	.5708	.710	1.200	.44
1983	.664	.550	.760	1.190	.62
1984	.587	.550	.810	1.250	.42
Soybeans, per bushel:					
1982	5.69	5.02	NA	12.90	2.98
1983	7.81	5.02	NA	13.00	4.20
1984	5.90	5.02	NA	13.00	3.28
Milk, per hundredweight:					
1982	13.61	13.59	NA	20.00	9.35
1983	13.58	13.57	NA	21.00	9.48
1984	13.46	13.45	NA	22.40	9.84

NA = Not applicable.

Sources: (*78*, *77*, and this report).

If price supports were a constant multiple of the marginal social cost for all commodities, serious distortions would result because the value-added per unit is not uniform across all commodities. For example, value-added per unit is higher for soybeans than that for wheat and corn, which is higher than that for cotton. A 5-percent markup over marginal social cost would proportionally increase the cotton producer's margin far more than it would the soybean producer's margin, giving the cotton grower a larger subsidy than the soybean farmer.

Parity Income

Income parity is an ideal that has been sought since the earliest farm legislation. It depicts a balance between the income or economic well-being of farm and nonfarm people. When it was enacted, farming was a fairly uniform industry. The income balance, consequently, could be inferred from the average income of farmers and the average income of nonfarmers. But agriculture in the 1980's is no longer uniform. More than 80 percent of the farm output is produced by fewer than 20 percent of the farms which reap virtually all of the industry net farm income. Yet operators of farms with sales less than $100,000 realize more income off the farm than on the farm. To be relevant, an income parity standard must consider income from all sources and deal explicitly with the varied nature of agriculture.

But how can income parity for American farmers be realized in the 1980's and beyond? To deal effectively with this issue, legislators must grapple with some basic questions: How would one specify a parity income program? Who would qualify for such a program? What is the size of payment going to be? How is the payment from the U.S. Treasury going to be transferred to the farmer?

Achieving income parity requires more than simply raising farm product prices. The issue of farm size must be addressed. While income parity is intended to improve farm living standards, the greatest needs for improvement are among modest-sized farms, and higher prices would not eliminate those needs. Higher prices have little effect on the income of those farm operators who have little to sell. The biggest gains would go to the larger farmers, who are more efficient, and who already have substantial incomes, but would not improve the inadequate incomes and low living levels of the small farmer. Raising prices would only widen the gap between the low-sales group and other producers.[29]

Table 19, which presents the size of the farmers' actual income shortfalls, shows why. The average farmer in the $40,000 to $99,999 sales class realized $2,673 less total income than the median U.S. family in 1983. If that income deficit were erased through a price increase, farmers in the next larger size classes (who already realize more income than the median family) would receive

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[29] Table 11 showed that a 3.42-percent increase in prices received would have raised the average total income of farmers in the $40,000 to $99,999 sales class in 1983 from 89.1 percent of the median income of all U.S. families to 100 percent. That price rise would increase the incomes of farmers in the $200,000 to $499,999 sales class by $11,493, or 15 percent, while raising the average total income of those in the $20,000 to $39,999 sales class by only $594, or 3.2 percent.

Table 19--Income changes needed to achieve income parity, by sales class, 1960-83

Year	Sales class (dollars)								
	500,000 and over	200,000 to 499,999	100,000 to 199,999 1/	40,000 to 99,999 2/	20,000 to 39,999	10,000 to 19,999	5,000 to 9,999	2,500 to 4,999	0 to 2,499
	Dollars								
1960	NA	NA	NA	-13,831	-4,138	-733	834	1,841	2,082
1961	NA	NA	NA	-14,948	-4,453	-636	558	1,625	1,844
1962	NA	NA	NA	-14,680	-4,206	-906	575	1,636	1,735
1963	NA	NA	NA	-14,634	-3,965	-760	598	1,649	1,577
1964	NA	NA	NA	-14,054	-4,153	-932	488	1,615	1,514
1965	NA	NA	-33,675	-11,859	-4,128	-889	514	1,656	1,345
1966	NA	NA	-44,258	-14,294	-5,296	-1,230	451	1,558	1,284
1967	NA	NA	-29,301	-10,876	-3,699	-439	818	1,695	1,400
1968	NA	NA	-30,946	-10,893	-3,743	-346	934	1,800	1,526
1969	NA	NA	-95,292	-15,552	-4,705	197	1,858	3,324	2,847
1970	NA	NA	-96,208	-13,994	-3,914	392	2,144	3,424	2,639
1971	NA	NA	-87,298	-12,726	-3,238	761	2,282	3,358	2,490
1972	NA	NA	-97,719	-15,377	-4,435	47	1,745	2,828	2,064
1973	NA	NA	-116,007	-17,748	-5,267	-659	789	1,437	798
1974	NA	NA	-111,197	-12,613	-2,986	388	936	1,002	183
1975	-601,765	-93,560	-35,053	-8,483	1,331	3,224	2,995	2,393	2,038
1976	-576,282	-82,398	-30,220	-6,166	2,350	3,359	3,019	2,617	2,091
1977	-540,588	-68,765	-23,972	-3,161	4,267	4,764	4,441	4,423	3,733
1978	-597,617	-75,916	-27,813	-5,048	3,504	3,976	3,710	4,004	3,217
1979	-560,105	-63,218	-20,172	-842	5,056	3,740	3,040	3,429	1,972
1980	-596,248	-55,075	-13,802	3,292	7,274	4,820	3,539	3,631	1,872
1981	-593,358	-44,468	-7,212	7,268	9,544	6,131	4,291	4,128	2,118
1982	-584,454	-45,435	-8,193	6,927	9,843	6,809	5,040	4,960	2,997
1983	-571,607	-52,264	-13,894	2,673	8,087	6,256	4,689	5,071	3,286

NA = Not available.

1/ In 1965-74: $100,000 and over.
2/ In 1960-64: $40,000 and over.

Sources: Computed from table 9 and appendix table 1.

windfalls which are 2, 4, and 22 times the deficit of the farmers in the $40,000 to $99,999 sales class.

A more effective approach would have been to give every operator meeting some criterion the same dollar amount (*10*). However, who would be eligible to receive the lump sum payments offsetting these income deficits, and how costly would it be to administer such a program? The group with the largest deficits would be targeted. The largest deficits in recent years ranged between $8,000 and $10,000 per family annually, and were realized by farms with sales of $20,000 to $39,999. Farms selling between $10,000 and $99,999 as a group realized a combined deficit of $7.3 billion in 1982 and $5.0 billion in 1983, an average of $7,773 and $5,325 per family, respectively. Estimating the Federal budget exposure for such a lump sum distribution is relatively simple, since it is the product of the payment and the number of qualifying farms. For example, in 1983 there were 932,000 farms with sales of $10,000 to $99,999, and 284,000 farms with larger sales.

If size were the eligibility factor used to administer a parity income program for a diverse agricultural sector, legislation should specify some dimension of the representative farm unit for comparison with the nonfarm standard. In the face of continuing price and structural change, the size characteristic of that representative unit would periodically have to be updated.

Sales is a convenient, if imperfect, indicator of farm size. This report recommends using the average farm selling $40,000 to $99,999 worth of products as the representative unit on which to base the parity income calculation. The rationale for this recommendation is that larger farms already realize more income than the average U.S. family, and smaller farms realize more nonfarm than farm income and generate too few sales to expect much farm profit increase.

One of the key factors determining what any parity income payment should be, however, is nonfarm income. The point at which nonfarm income exceeds farm income figures importantly in the distribution of farms. That point has changed over time. Since 1980, farms selling less than $100,000 realized, on average, more nonfarm income than farm income. From 1976 to 1979, $40,000 was the break point. In 1973, 1974, and 1975, $20,000 sales was the cutoff. From 1965 to 1972, $10,000 sales divided the classes. And in 1960-64, $5,000 sales separated them.

What shape would administration of a parity income program take? One means to administer a parity income payment program would be as a refundable income tax credit, with qualifying sales determined by schedule F of the Federal income tax. Another model is the portion of the Agricultural Act of 1938 dealing with "parity payments," which is part of the permanent law not currently in effect.

By way of comparison, however, the price increases needed to restore the price level to 100 percent of 1910-14 parity are substantial. With the parity ratio ranging in the 50's during the mid 1980's, price increases of nearly 75 percent or more are needed to achieve price parity (table 20). That size of price increase would convey parity income to virtually all farms selling as little as $5,000 per year. Yet, the smallest farms would still receive less income than the median U.S. family, while the average farm with sales more than $500,000 would reap nearly $2 million a family.

Summary. Price policy can influence only the farm income of farm families, and then only the portion derived from cash sales of supported commodities. Price policy slants benefits toward farmers who already have some of the largest incomes in the sector. A lump sum parity income payment, on the other hand, could increase the net income of all farm families the same amount without distorting the income distribution among farmers.

Attaining income parity for a well chosen representative of commercial agriculture is a more viable farm policy goal than restoring 1910-14 price parity. If income parity is going to be monitored, the U.S. Department of Agriculture will have to commit a significant annual amount of staff and budget to study farm structure and structural change processes.

A CONCLUDING PERSPECTIVE

Parity is an equity concept rooted in the desire for fair and just treatment of agriculture in relation to the rest of the economy. Price parity, in particular, has permeated discussions of agricultural policies, and its tenets have pervaded Federal farm legislation for more than half a century. But times have changed and the fairness of past relationships, which fit the circumstances of the 1930's, is absent in the 1980's. Policy which is appropriate when 6 million farms provide more than one-third of the national employment does not fit a situation in which farms provide only 3 percent of the national employment. Moreover, it does not fit a situation in which the bulk of farm output originates on the largest half million farms that can prosper, even at market prices registering below 50 percent of parity.

Table 20--Price changes needed to achieve price parity

Year	Parity ratio	Needed increase	Year	Parity ratio	Needed increase
	Percent of 1910-14	Percent		Percent of 1910-14	Percent
1970	72	39	1978	70	42
1971	70	42	1979	71	41
1972	74	36	1980	65	54
1973	91	10	1981	61	64
1974	86	16	1982	56	77
1975	76	32	1983	56	80
1976	71	41	1984	58	73
1977	66	51	1985	52	91

Source: (*78*).

The foundation of price support policy in permanent farm legislation can be changed to restore the guiding principle of balance among members of society. The alternatives outlined in this report can serve as a basis on which to make that change.

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APPENDIX

Supporting Data

Appendix table 1--Total income per farm operator family (including farm households) by value of sales class, 1960-83

Year	Sales class (dollars)								
	500,000 and over	200,000 to 499,999	100,000 to 199,999 1/	40,000 to 99,999 2/	20,000 to 39,999	10,000 to 19,999	5,000 to 9,999	2,500 to 4,999	0 to 2,499
	Dollars								
1960	NA	NA	NA	19,451	9,758	6,353	4,786	3,779	3,538
1961	NA	NA	NA	20,683	10,188	6,371	5,177	4,110	3,891
1962	NA	NA	NA	20,636	10,162	6,862	5,381	4,320	4,221
1963	NA	NA	NA	20,883	10,214	7,009	5,651	4,600	4,672
1964	NA	NA	NA	20,623	10,722	7,501	6,081	4,954	5,055
1965	NA	NA	40,632	18,816	11,085	7,846	6,443	5,301	5,612
1966	NA	NA	51,790	21,826	12,828	8,762	7,081	5,974	6,248
1967	NA	NA	37,234	18,809	11,632	8,372	7,115	6,238	6,533
1968	NA	NA	39,578	19,525	12,375	8,978	7,698	6,832	7,106
1969	NA	NA	104,725	24,985	14,138	9,236	7,575	6,109	6,586
1970	NA	NA	106,075	23,861	13,781	9,475	7,723	6,443	7,228
1971	NA	NA	97,583	23,011	13,523	9,524	8,003	6,927	7,795
1972	NA	NA	108,835	26,493	15,551	11,069	9,371	8,288	9,052
1973	NA	NA	128,058	29,799	17,318	12,710	11,262	10,614	11,253
1974	NA	NA	124,099	25,515	15,888	12,514	11,966	11,900	12,719
1975	615,484	107,279	48,772	22,202	12,388	10,495	10,724	11,326	11,681
1976	591,240	97,356	45,178	21,124	12,608	11,599	11,939	12,341	12,867
1977	556,597	84,774	39,981	19,170	11,742	11,245	11,568	11,586	12,276
1978	615,257	93,556	45,453	22,688	14,136	13,664	13,930	13,636	14,423
1979	579,692	82,805	39,759	20,429	14,531	15,847	16,547	16,158	17,615
1980	617,271	76,098	34,825	17,731	13,749	16,203	17,484	17,392	19,151
1981	615,746	66,856	29,600	15,120	12,844	16,257	18,097	18,260	20,270
1982	607,887	68,868	31,626	16,506	13,590	16,624	18,393	18,473	20,436
1983	596,187	76,844	38,474	21,907	16,493	18,324	19,891	19,509	21,294

NA = Not available.

1/ In 1965-74: $100,000 and over.
2/ In 1960-64: $40,000 and over.

Source: (74).

Appendix table 2--Gross cash farm income per farm, by sales class

Year	Sales class (dollars)								
	500,000 and over	200,000 to 499,999	100,000 to 199,999 1/	40,000 to 99,999	20,000 to 39,999	10,000 to 19,999	5,000 to 9,999	2,500 to 4,999	0 to 2,499
				Dollars					
1970	NA	NA	347,340	72,156	34,895	18,371	9,378	4,834	1,557
1971	NA	NA	339,117	71,696	34,633	18,072	9,216	4,717	1,448
1972	NA	NA	341,392	72,390	35,121	18,288	9,355	4,764	1,442
1973	NA	NA	334,898	70,343	33,899	17,361	8,834	4,439	1,371
1974	NA	NA	342,393	67,918	33,040	16,630	8,415	4,181	1,203
1975	1,825,243	330,654	155,654	71,176	32,888	16,543	8,373	4,260	1,384
1976	1,819,345	328,060	154,686	71,153	32,666	16,381	8,260	4,196	1,379
1977	1,824,585	329,231	156,114	72,657	33,213	16,590	8,403	4,284	1,437
1978	1,817,120	328,086	156,381	73,579	33,392	16,564	8,416	4,273	1,460
1979	1,802,529	323,028	153,200	71,552	32,508	16,211	8,145	4,147	1,409
1980	1,798,288	321,997	152,616	71,224	32,351	16,141	8,102	4,126	1,399
1981	1,800,773	323,578	153,740	71,983	32,723	16,315	8,216	4,191	1,438
1982	1,803,827	326,112	155,581	73,274	33,303	16,549	8,401	4,281	1,483
1983	1,820,877	336,439	162,802	78,248	35,477	17,394	9,094	4,607	1,630

NA = Not available.

1/ In 1970-74: $100,000 and over.

Source: (74).

Appendix table 3--Level and variability of prices received and paid by farmers, and parity ratio (1910-14 base), selected periods

Period	Index of prices received	Index of prices paid	Parity ratio
	(1910-14 index value = 100)		
1973-1977:			
Average level	462.4	600.8	78.0
Standard deviation[1/]	11.1	70.1	9.2
1979-1983:			
Average level	614.4	1,002.6	62.0
Standard deviation	10.3	93.7	5.6
1975-1979:			
Average level	502.0	709.6	70.8
Standard deviation	55.6	81.7	12.2
1980-1984:			
Average level	623.8	1,058.4	59.4
Standard deviation	15.2	63.1	16.6

[1/] The standard deviation is calculated around the average for the period.

Source: (*78*).

Appendix table 4--Multifactor productivity comparison, U.S. farm and nonfarm economy

Year	U.S. farm output per unit of input	Private nonfarm business sector multifactor productivity	Ratio of farm to nonfarm productivity	U.S. total farm output
		Percent of 1977		
1948	63	65	98	63
1949	61	64	95	62
1950	61	68	89	61
1951	61	70	88	63
1952	63	70	89	66
1953	64	72	90	66
1954	65	71	92	66
1955	67	74	90	69
1956	68	74	92	69
1957	69	74	93	67
1958	74	74	100	73
1959	74	78	95	74
1960	77	78	99	76
1961	78	79	99	76
1962	79	82	97	77
1963	82	84	98	80
1964	81	87	93	79
1965	86	89	96	82
1966	83	91	92	79
1967	86	91	95	83
1968	87	93	94	85
1969	88	92	96	85
1970	87	91	96	84
1971	94	92	102	92
1972	94	96	98	91
1973	95	98	97	93
1974	90	94	96	88
1975	99	94	106	95
1976	98	97	101	97
1977	100	100	100	100
1978	102	101	101	104
1979	105	99	106	111
1980	100	97	103	103
1981	116	97	119	118
1982	117	96	122	116
1983	100	99	101	95
1984	116	103	113	111

Sources: (*75, 83, 84*).

Appendix table 5--Selected commodities: Production, 1974-84

Year	Wheat	Rice	Feedgrains	Cotton	Milk
	Mil. bu.	Mil. cwt.	Mil. bu.	Mil. lb.	Mil. cwt.
1974	1,782	112	6,224	5,539	1,156
1975	2,127	128	7,613	3,985	1,154
1976	2,149	116	7,923	5,079	1,202
1977	2,046	99	8,467	6,907	1,227
1978	1,776	133	9,036	5,225	1,215
1979	2,134	132	9,645	7,022	1,234
1980	2,381	146	8,038	5,339	1,285
1981	2,785	183	9,982	7,510	1,330
1982	2,765	154	10,179	5,742	1,358
1983	2,420	100	5,649	3,730	1,400
1984	2,596	137	9,585	6,380	NA

NA = Not available.

Source: (70).

Appendix table 6--Selected commodities: Calendar year average prices, 1975-84

Year	Wheat	Rice	Corn	Cotton	All milk sold to plants
	Dol./bu.	Dol./cwt.	Dol./bu.	Dol./lb.	Dol./cwt.
1975	3.68	8.35	2.70	0.412	8.78
1976	3.15	7.02	2.49	.597	9.66
1977	2.29	9.49	2.03	.605	9.71
1978	2.82	8.16	2.10	.552	10.60
1979	3.51	10.50	2.36	.580	12.00
1980	3.86	12.80	2.70	.690	13.10
1981	3.88	9.05	2.92	.671	13.80
1982	3.52	8.11	2.37	.555	13.60
1983	3.58	8.76	2.99	.629	13.60
1984	3.36	8.11	3.05	.655	13.40

Source: (70).

Appendix table 7--Milk: Average variable costs of production, 1982-84

Year	U.S. average	Upper Midwest	Northeast	Corn Belt	Pacific	Appalachia	Southern Plains
				Dollars per hundredweight			
1982	7.39	6.33	7.56	7.36	8.39	8.56	9.35
1983	7.93	6.84	8.00	8.30	8.99	9.48	9.11
1984	8.02	7.01	8.16	8.27	8.68	9.70	9.84
				Dollars per cow			
1982	1,020	829	1,059	967	1,334	1,170	1,241
1983	1,121	924	1,152	1,112	1,451	1,297	1,254
1984	1,122	931	1,153	1,100	1,425	1,282	1,367
				Hundredweight per cow			
1982	137.96	130.99	140.06	131.44	158.96	136.72	132.67
1983	141.38	135.04	144.06	133.93	161.46	136.85	137.70
1984	139.90	132.81	141.25	133.03	164.12	132.17	138.95

Source: (72).

Appendix table 8--Corn: Average variable costs of realized production, 1975-84

Year	U.S. average	Corn Belt and Lake States	Northern Plains	Northeast	Southwest	Southeast
			Dollars per bushel			
1975	0.92	0.86	0.90	0.94	1.20	1.48
1976	.86	.82	.84	.89	.98	1.18
1977	.87	.81	.76	1.00	1.04	1.82
1978	.84	.79	.74	.99	1.22	1.42
1979	.88	.83	.87	1.05	1.16	1.31
1980	1.29	1.18	1.36	1.49	1.54	2.33
1981	1.20	1.12	1.23	1.36	1.45	1.85
1982	1.14	1.08	1.18	1.33	1.61	1.47
1983	1.58	1.53	1.48	1.65	1.71	2.35
1984	1.28	1.22	1.28	1.23	1.86	1.59

Sources: (*43, 72*).

Appendix table 9--Soybeans: Average variable costs of realized production, 1975-84

Year	U.S. average	Corn Belt and Lake States	Northern Plains	Delta States	Southeast
			Dollars per bushel		
1975	1.29	0.99	1.04	1.83	2.19
1976	1.31	1.02	1.14	1.80	2.11
1977	1.29	.96	.90	1.95	2.44
1978	1.45	1.08	1.05	2.05	2.64
1979	1.50	1.20	1.02	1.94	2.40
1980	2.06	1.42	1.56	3.77	4.63
1981	2.01	1.56	1.28	3.22	3.31
1982	1.88	1.52	1.40	2.59	2.99
1983	2.23	1.78	1.89	2.88	4.20
1984	2.18	1.86	2.18	2.55	3.28

Sources: (*43,72*).

Appendix table 10--Hard red winter wheat: Average variable costs of realized production, 1975-84

Year	U.S. average	Northern Plains	Central Plains	Southern Plains	Southwest
			Dollars per bushel		
1975	0.96	0.71	0.81	1.24	1.30
1976	1.05	.78	.85	1.50	1.24
1977	.92	.73	.77	1.22	1.34
1978	.89	.82	.72	1.23	1.19
1979	.94	1.24	.79	1.07	1.22
1980	1.32	1.44	1.06	1.79	1.43
1981	1.80	1.19	1.54	2.25	2.27
1982	1.64	1.26	1.32	2.15	2.51
1983	1.30	1.30	1.06	1.61	2.56
1984	1.56	1.66	1.21	2.05	2.30

Sources: (*43,72*).

Appendix table 11--Soft red winter wheat: Average variable cost of realized production, 1975-84

Year	U.S. average	Corn Belt and Lake States	Southeast	Northeast
		Dollars per bushel		
1975	1.43	1.35	2.08	1.62
1976	1.25	1.20	1.39	1.66
1977	1.16	1.07	1.45	1.56
1978	1.18	1.07	1.50	1.57
1979	1.24	1.13	1.65	1.77
1980	1.66	1.50	2.02	2.09
1981	1.81	1.66	1.98	2.39
1982	1.99	1.79	2.14	2.43
1983	1.89	1.66	2.18	1.94
1984	1.90	1.84	1.97	2.08

Sources: (*43, 72*).

Appendix table 12--Cotton: Average variable costs of realized production, 1975-84

Year	U.S. average	Southern Plains	Southwest	Delta States	Southeast
			Dollars per pound		
1975	0.309	0.276	0.308	0.315	0.445
1976	.297	.231	.288	.362	.416
1977	.284	.236	.309	.301	.535
1978	.350	.281	.421	.356	.465
1979	.324	.280	.355	.336	.463
1980	.470	.479	.408	.522	.722
1981	.372	.355	.359	.398	.464
1982	.386	.441	.407	.323	.373
1983	.429	.429	.414	.410	.620
1984	.392	.393	.422	.359	.398

Sources: (*43,72*).

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